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TOPOGRAPHIC FORMS OF THE UNITED STATES.

BY

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During the past quarter of a century the topographic branch of the United States Geological Survey has been actively engaged in making a detailed map of the United States. In this time it has surveyed 872,000 square miles, or nearly 30 per cent. of the area of the country, and the results have been published on about 800 separate atlas sheets. These are about 13 by 17 inches in dimensions, and each represents from 225 to 900 square miles, according to its scale. This work has now progressed to the point where typical portions of the varied topographic features of the United States have been mapped, and from an inspection of them we may gain an insight into the physiography of our continent.

A study of the country with these maps in hand creates a new interest in the natural features which surround us. It is one thing to look at a beautiful flower; it is quite another to dissect it and to analyze and discover the framework which gives it form and permits its classification. In the same way a new interest is developed in the examination of the scenery of a region, when its topography has been interpreted and classified in the light of an analysis of the underlying rocks which give it form. Especially is this true for the teacher, who gains thus an experience which gives his subject a vividness to be gained in no other school.

The mapping has so far been prosecuted chiefly in those portions of the United States in which economic minerals and rocks may be sought. This includes the mountains of New England and the Appalachian Mountains of the Middle and Southern States; portions of Michigan, Arkansas, and Texas; and the areas in which

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silver and gold and their associated metals are found in the Far West. Also, some special areas in which particular investigation has been made regarding the value of lands for agricultural purposes; or as producers of forests; or in connection with the development of irrigation. From these initial regions the mapping is now being extended into all portions of the United States.

The essential feature of these maps is that which represents topographic form, or, as it is more commonly called, the surface relief. This is by lines of equal elevation called "contour lines." These express uniform differences of elevation in terms of their horizontal projection on a map surface. Consequently, the distances between them in plan give the slopes and grades of the surface forms. The base to which these differences of height are referred is the mean level of the sea. The shore-line marked by the ocean is the zero of elevation, or the zero contour line. If the contour interval is, for example, 50 feet, you may imagine the height of the surface of the ocean raised by that amount and its shore-line re-mapped. This line will be the 50 feet contour line, every point upon it having that elevation above the level of the sea. If now the sea were raised 50, 100, and 150 feet, etc., and its successive shore-lines mapped, the result would be a topographic map having a contour interval of 50 feet. By observing the horizontal distance apart of these contour lines, an idea of the steepness of the various slopes is obtained. Thus if two 50-foot contour intervals occur in a mile horizontally, the slope is 100 feet to the mile. If the same number occur in a quarter of a mile horizontally, the slope is four times as steep, or 100 feet in a quarter of a mile, etc.

The various topographic forms found on the surface of the earth have been aptly described as "expressing geologic structure, much as the outlines of the human body express anatomical structure." Accepting this as true, it is obvious that the classification and interpretation of such forms require a knowledge of the origin of the rock structure underlying a given region and the agencies which have acted upon its surface. The processes which have produced the various topographic forms are called physiographic, and physiography has been well defined as "a description of the surface features of the earth." Accordingly, the study of physiography includes an explanation of the origin of topographic features.

Physiographic processes may be divided into two great classes, according as they have been produced by agencies which are constructive or destructive. An example of the former is a volcanic cone built of ejecta from the vent of a volcano. An example of the

latter is to be found in the cliffs bordering the ocean, which are washed and worn away by wave action.

The constructive agencies which leave the most evident marks upon the surface of the earth in topographic forms are those due—1, to diastrophic action, by which regions sink and rise; 2, to volcanic action; and 3, to deposition, as from water carried in overloaded streams or gravel deposited from glaciers. The more important destructive agencies are—1, Those due to aqueous erosion, as from flowing water; 2, those due to aerial erosion, as wind-borne sand abrasion; 3, those due to corrasion, which is a wave or glacial action; and 4, those due to disintegration resulting from frost, chemical action, etc. Aqueous agencies are those chiefly potent in shaping topographic forms. The effects of these are so commonly seen as to have gained them the name of regular forms, while those forms resulting from other agencies have been called irregular.

The massive features produced by the great constructive and destructive agencies are finally eroded into the more familiar topographic forms with which we are acquainted. This modelling takes various forms, due—1, To the character and hardness of the rock; 2, to the geologic structure or position of bed-rock; 3, to the slope of the surface; 4, to climatic conditions; 5, to accidents during development; and 6, to the length of time during which the eroding agencies have acted.

Among the more important constructional forms due to the action of diastrophism and illustrated in the topographic maps of the United States are the following:

Emerged plains are illustrated in the coastal plains shown on the Goldsboro, N. J., and Leonardtown, Md., sheets. In the latter case erosion has considerably modified the more level form which the plain had immediately upon emergence; Plateaux are illustrated on the Charleston, W. Va., sheet, Cañon de Chelly, Ariz., and Lamar, Col., sheets. The former have both been highly eroded, while the latter, which is of more recent origin shows less the effects of weathering; Block and massive mountain ranges are illustrated on the Abajo, Utah, and La Plata, Col., sheets; Lake basins and lacustrine plains are illustrated on the Diaster, Nev., and Lassen Peak, Cal., sheets.

Of constructional forms due to the action of volcanism excellent examples are those illustrated in the lava plains of the Bisuka, Idaho, and of the Mt. Taylor, N. Mex., sheets. Also the volcanic cones in the neighbourhood of Mt. Shasta, Cal.

Among the more important gradational forms illustrated in the

topographic maps of the United States, and which are due to the action of water, are the following: Alluvial cones are shown admirably on the Cucamonga, Cal., sheet. Alluvial plains are illustrated on the same sheet and on Fargo, N. Dak., also in the built-up valley lands of the lower Mississippi on the Donaldsonville sheet. Wash plains are shown on the Brackett, Tex., and Camp Mojave, Cal., sheets.

Of the aggradational forms produced by ice excellent examples are some of the following: The drumlins and moraines of central New York shown on the Syracuse sheet; those of Wisconsin on the Sun Prairie and Eagle sheets.

Terminal moraines and glacial plains and drift sheets are shown on the Marion, Ia., sheet.

Gradational forms resulting from wind action are well illustrated in the sand dunes of the Provincetown, Mass., sheet, the Coos Bay, Ore., and Kearney, Nebr., sheets. Those due to action of degradation are well illustrated in the sculptured forms, resulting from the erosive action of water. Examples of these are the dissected plateaux of the Fort Payne, Ala., and Charleston, W. Va., sheets.

Residual forms left after the removal of surrounding materials by erosive action of water are excellently shown in the mesas on the Marsh Pass, Ariz., and East Tavaputs, Utah, sheets. The same are shown in the massive mountain ranges throughout the country, and especially in the monadnocks or massive rocky hills, which, because of their hardness, have been left standing after erosion has removed their surrounding envelopes. An example of the latter is Mt. Monadnock, New Hampshire.

FETISHISM, A GOVERNMENT.

BY

ROBERT HAMILL NASSAU.

In civilisation, under governments other than autocratic, law being made and executed, at least professedly, with the consent of the governed, all enactments find not only their justification, but also the possibility of their enforcement in their support by public opinion. It is the general consensus as to the need of an enactment regarding certain conditions, affecting the lives or happiness or rights of the majority, that crystallises opinions into a form of words and gives authority for the enforcement of the decisions expressed by those words.

This is also partly true even under governments more or less despotic, where the will of the ruler, not of the ruled, is made the basis of law. Few despots are so utterly tyrannical as deliberately to arouse opposition on the part of their subjects. Even a Nero, who would refuse a petition if it happened to run counter to his whim, would grant that same petition if it happened to coincide with his own whim of another day. Even he thought it desirable to pander to the public taste for the butcheries of the amphitheatre, not simply because he himself enjoyed them. Though he could initiate no measure for the real good of Rome, he recognized the necessity of responding to the cry, *panem et circenses.*

In all governments fear is recognized as one of the grounds for the enforcement of law. In even the great nations and under the highest form of civilisation, the public opinion that administers law makes its demand partly in the interest of essential right, partly with the instinct of self-preservation against forces of evil, and partly for the punishment of wrong. Punishment in itself is not reformatory. It is retributive; it is deterrent; it plays upon fear.

In the native African tribal forms of government, while it would not be true to say that there is no justice in the customs they recognize, it is true that the only sentiment appealed to in the enforcement and even in the enactment of supposed needed measures is that of fear. Their religion being one of fear, it is therefore appealed to, to lend its sanction and aid.

Among the negro tribes of the Bight of Benin, and the Bantu of the region of Corisco Island and of the Ogowe River, in what is now

the Congo Français, there was a power known variously as Egbo, Ukuku, and Yasi, which tribes, native chiefs, and headmen of villages invoked as a Court of last Appeal, for the passage of needed laws, or the adjudication of some quarrel which an ordinary family or village council was unable to settle.

In those councils an offender could be proved guilty of a debt, or theft, or other trespass, and when it was no longer possible for him by audacity or mendacity to persist in his assertion of innocence, he would yield to the decision of the great majority against him. But there was no central government to enforce that decision or exact from him restitution. The only authority the native chiefs possessed was based on respect due to age, parental position, or strength of personal character.

If an offender chose to disregard all these considerations an appeal was then made to his superstitious fear.

Egbo, Ukuku, Yasi, was a secret society composed only of men; boys being initiated into it about the age of puberty. Members were bound by a terrible oath and under pain of death to obey any law or command issued by the Spirit under which the Society professed to be organised. The actual, audible utterance of the command was by the voice of one of the members of the Society, chosen as priest for that purpose. This man, secreted in the forest in a clump of bushes on the outskirts of the village, or in one of the rooms of the Council House, disguised his voice, speaking only gutturally. The whole proceeding was an immense fiction. They believed in spirits, in the power of fetish charms, they made such charms as part of the Society's ceremonies; but, as to the decisions, all the members knew that the decision in any case was their own, not a spirit's. They knew that the voice speaking was that of their delegate, not of a spirit. Yet, for any one of them, or for any woman, girl, or uninitiated boy to have said that would have been death. And those men who would not have submitted to that same decision if arrived at in open council of those same men as *men*, and known before the whole village to be speaking only as men, would instantly submit when once the case had been taken to Ukuku's Court. They carried out that fiction all their lives. Let a man order his wives and other slaves to clear the overgrown village paths, they might hesitate to obey by inventing some excuse that they were too much occupied with other work, or that they would do it only when other people, who also used the same path, should assist. Or, if under the sting of a *kasa-nguvu* (lash of hippopotamus hide or manatus skin), they started to do the work, they might do it only partly or

very unsatisfactorily. But let that same man call in the other men of the village, and summon a meeting of the Society, those same women would submit instantly and in terror of Ukuku's voice. Much as they may possibly have suspected it was a human voice, they did not dare whisper that suspicion. Themselves helped to carry on a gigantic lie. They taught their little children, both girls and boys, that that voice belonged to a spirit which ate people who disobeyed him. When the Society walked in procession to or from their appointed rendezvous they were preceded by runners, who, with a well-organized cry and with kasa-nguvu in hand, warned all on the path of the coming of the Spirit. Women and children hastened to get out of the way, or, if unable to hide in time, they were to avert their faces. The penalty for a woman even seeing the procession was a severe beating (that, however, might be commuted to a fine).

About thirty-seven years ago, in the island of Corisco, the then headquarters of the Corisco Mission, there was a long-standing feud between the Benga tribe, inhabiting that island, and the Kombe tribe, dwelling at the mouth of the Eyo River of the Benita country, fifty miles to the north. Benita was also a part of our mission field. The quarrel between the two tribes greatly obstructed our mission work. Missionaries were entirely safe to travel between the two places, respect being given them as foreigners, and their presence in a boat protected their crews; but it was often difficult to obtain a crew willing to go on that journey without the presence of a white man. The difficulties caused by the feud fell heavily also on the Benga people themselves. The island itself had no products for trade. Ivory, dye-woods, and rubber came from the Benita mainland. Many Kombe women had married Benga men and needed frequently to revisit their own country. Finally, to end the feud, it was agreed that the Kombe Ukuku Society, whose power was held in even greater fear than that of Benga, should come to Corisco and settle the affair.

It was a day of terror at the Girls' Boarding School, of which I was then Superintendent. As the long, blood-curdling yell of the forerunners, on the public path that ran only one hundred feet from the school dwelling, announced the approach of the procession, the girls fled, affrighted, to the darkness of the attic of the house, and subsequently, after the procession had passed, they ran away secretly in byways to their own villages, feeling safer in the darkness of their mothers' huts than in the mission house; for it had been reported that Ukuku, besides settling the tribal feud, intended to attack the mission work that had been successfully making converts

among the Kombe, because any native who became a Christian immediately withdrew from membership in the Society. It had, therefore, begun to feel a little anxious about its safety. I stood at my door and saw the procession pass. They saw me, but because of my sex they did not show any displeasure. They were painted with white and other coloured chalks that gave a horrible expression to their faces; their look was defiant; and a hoarse, muttered chant had, even on myself, a depressing effect. I could well imagine that to a superstitious native mind the *tout ensemble* would be terrifying.

The procession on its way chose to pass over a road that had by use become somewhat public, but which was owned by the Mission, and it was only fifty feet distant past the front door of the house of the senior missionary, the Rev. James L. Mackey. Mrs. Mackey was standing at the door of the house. Not being a Benga woman, she saw no reason why she should retire before Ukuku, and she did not. Ukuku went to their rendezvous in a rage, and the Kombe portion demanded the life of the woman who not only had not hidden her face in their presence, but had dared persistently to look upon them. This demand was modified by the Benga portion to a fine; whipping, not even they daring to suggest for a white lady. That demand for a fine was actually brought to Mr. Mackey, who gave a dignified reply, pointing out (1) that, as foreigners, white people were not subject to Ukuku; (2) that Ukuku had trespassed on Mission private property, and was itself responsible for being seen; (3) that, as a Christian, in no case could he recognize the authority of Ukuku to order or fine him. In reply, Ukuku made the point that they were the government of the country, and that even foreigners were bound to obey law. (Corisco actually belonged to Spain, but Spain in no way exercised any visible authority whatever over it.)

They admitted their trespass on private property, but still demanded the fine. Mr. Mackey made no further reply; and, of course, as a matter of conscience, refused to pay the fine. But it transpired afterwards that native friends, fearful lest matters should come to an ugly pass through his refusal, privately paid the fine themselves. The missionary, unaware of this, thought he had triumphed. Really, Ukuku had; but not unqualifiedly, for it was a shock to his power that it should have been disputed at all, even by a white man.

About the same time a young slave man, who was beginning to attend church with desire to become a Christian, was sitting in a village where was being held a meeting of the local Ukuku Society.

The object of the meeting was to alarm and drive back to a more constant performance of fetish observances some of the villages on which heathenism was beginning to lose its hold. In the course of his oracular deliverances the Ukuku priest mentioned by name this young man. In his fresh zeal as a convert he made a protest. Perhaps duty did not call for even that just at that time. But he even went beyond. As he was able to recognize the voice, though disguised, and knew who the owner of the voice was, he made a fatal mistake in saying, "You, such-a-one, I know who you are. You are only a man. Why are you troubling about me?" He was promptly dragged to the seaside and was decapitated.

While converts felt the propriety of abandoning their membership in the Society and any participation in its ceremonies, the Mission had not required of them nor deemed it desirable that they should make a revelation of its secrets.

But it had occurred in the early history of the Mission that one young man, Ibia, a freeman, member of a prominent family, had felt that in breaking away from heathenism and becoming a Christian he should cast off the very semblance of any connection with or even tacit endorsement of evil. He knew the Society was based on a great falsehood. As a lad he had believed Ukuku was a spirit. On his initiation he had found that this was not so. But, loyal to his heathenism and to his oath, he had assented to the lie and had assisted in propagating it. He was known for the fearlessness of his convictions, and in his conversion he, to a rare degree, emerged from all superstitious beliefs. Few emerge so utterly as he. He, therefore, publicly began to reveal the ceremonies practiced in the Ukuku meetings. At once his life was in danger. The two pioneer missionaries, Rev. Messrs. Mackey and Clemens, were men of exceptional strength of character and wise judgment, and had obtained a very strong hold on the respect and affection even of the heathen. Their influence, united with a small party of Ibia's own family and a few of the more civilized chiefs, was able to save his life; he being guarded in the mission-house until the fierceness of heathen rage should abate. But, though his enemies presently ceased from open efforts to kill him by force, they proclaimed that they would kill him by means of the very witchcraft power he was despising. They said they would concoct fetish charms which would destroy the life of his child, and that they would curse the ground on which he trod so that it should sicken his feet. Not long afterwards his infant child did die; and one of his feet for more than a year had a painful ulcer. The coincidence was startling, and somewhat tri-

umphant for the heathen. But infant mortality is large even among natives; and phagedenic ulcers of the leg are very common. Ibia recognized his afflictions as a trial of his faith permitted by God. He came out of his fiery trial strong, and his life since has been that of a reformer, uncompromising with any evil, earning from his own people their ill-will by his scathing denunciations of anything that savours of superstition. He is now the Rev. Ibia j Ikenge, member of Corisco Presbytery, and pastor of the Corisco Church. And Ukuku has long since ceased to exist on the island.

Like all government intended for the benefit and protection of the governed, Ukuku, when it happened to throw its power on the side of right, was occasionally an apparent blessing. It could end tribal quarrels and proclaim and enforce peace where no individual chief or king would have been able to accomplish that same result.

On one occasion the Rev. William Clemens took a young Benga man to locate him as evangelist in the bounds of a mainland heathen tribe, where there was some doubt as to the young man's safety. The village chief, though a heathen and entirely uninterested in the religious aspect of the case, was alive to the fact that the presence among his people of this young protégé of the white man would increase his tribal importance, and that his people themselves would derive a pecuniary benefit from even the small amount of money that would be spent on the evangelist's food. He therefore voluntarily offered to call an Ukuku meeting and have a law enacted that no one should machinate against the Benga's life by fetishes of any kind. Mr. Clemens declined the offer. If he accepted Ukuku's authority to defend him he might some day be called on to submit to that same power as an authority to punish him. He wisely avoided an entangling alliance. He told the chief that he preferred to entrust his protégé to his care and to rely on his promise rather than on Ukuku's. This compliment put the chief on his mettle; the evangelist's protection became to him a case of *noblesse oblige.*

The power of this Society was often used as a boycott to compel white traders as to the prices of their goods, using intimidation and violence after the manner of trades unions in civilized countries. This was true all along the west coast of Africa wherever no white government had been established. It ceased at Libreville, in the Gaboon country, after the establishment of a French colony in 1843, with a white governor, a squad of soldiers, police, and a gunboat. Also at such trade centres as Libreville, Ukuku early lost its position, for the population was too heterogeneous and there were too

many diverse interests. At the trading-houses were gathered native clerks and a large staff of servants as cooks, personal attendants, boatmen, etc., representing a score of tribes from distant parts of the coast. Whatever obedience they gave to similar societies in their tribes they did not feel bound by the local one, to which they were strangers; and they were disposed under a community of trade interests with their employers to disregard the society of the local tribe, to whom many of them felt themselves socially superior.

But at Batanga, in what is now the Kamerun Colony of the German Government, the Ukuku Society forty years ago carried itself with a high hand. Batanga was not then claimed by any European nation. Its trade in ivory was one of the richest on the west coast of Africa; so rich that the Batanga people became arrogant. Some of them despised to make plantations of native food supply, and lived almost entirely on foreign imported provisions, taking in exchange for their abundant ivory, barrels of beef and bags of rice and boxes of ship's biscuit. It was a case of demand and supply. The native got what he wanted in goods, and the white man obtained the precious ivory. But, in the competitions of trade, fluctuations in the market, and the growing demand of the natives for a higher price, there came days when some white man, seeing the margin of his per cent. or gain becoming too narrow, would refuse the current price. Doubtless, often the white men were arbitrary, not only in prices but in other things also. Doubtless, also, the natives were often exorbitant in their demands. When the differences became extreme the native chiefs called in the aid of Ukuku. The phrase was to "put Ukuku" on the white man's house. The trader was boycotted. He stood as under a major excommunication. No one should buy from or sell to him. No one should work for him. He was deserted by cook, steward, washerman, and all other personal attendants. Sentinels stood on guard to prevent food being brought to him or even to prevent him lighting a fire in his own kitchen if he should attempt to cook for himself.

The white trader generally succeeded in breaking down the interdict put upon him by three several means, viz.: (1) He had in his house a supply of canned goods and ship's biscuit, with which he would not starve. (2) His negro mistress almost always remained faithfully with him, secretly assisting him, divulging to him the plans of her own people—as in the history of Cortes and the conquest of Mexico. She dared to do this, being tacitly upheld by her own family. The position of "wife" to a white man was considered by the natives as an honourable one, and was sought by parents for their

daughters. It was an exceptional source of wealth for them. (3) If other means failed, the trader could almost always break the boycott by bribes of rum. Time was money to him. Often, indeed, in a malarial country, it was life to him. Though time was worth nothing to the native, the rum he had learned to love became a necessity to him. In cutting the white man from their ivory they had cut themselves from that white man's rum. A judicious expenditure of demijohns, in proper quarters, generally enabled Ukuku to revoke his own law. Then, perhaps, the white man would make some slight concession.

I had an experience of this kind in the Benitâ country in 1868. I had been there several years. There was growth in the desire for the good things that money can buy, but wages and prices had remained unchanged. I was obtaining all I needed of both labour and food without difficulty. Had I any difficulty I should, naturally, have offered more inducement. I was not aware that there was any discontent. None of my employees had asked for a rise, nor had people, in selling their vegetables, etc., complained of the price I gave.

Suddenly, one morning, a company of about twenty men, led by an ambitious heathen, whose manner had always been dictatorial to me, and to whom I had shown no favour, filed into the public meeting-room of our mission-house. I knew them all; none were in my employ, nor were any of them Christians. As if they thought it was hopeless to attempt to obtain anything from me by petition or respectful request, they seemed to have decided to stake all on a demand and threat. They suddenly and harshly began, "We've come to order you to change prices." Naturally, I felt nettled, and replied that I saw no reason why I should take orders from them. They rose in a rage and said, "Then we'll put Ukuku on you—(1) No one shall work for you. (2) No one shall sell you food or drink. (3) You shall not go yourself to your spring." And, with a savage yell, they left the house. Instantly, a great terror fell on the native members of my household. Those who were heathen dropped work and went to their villages. Those who were Christians came to me distressed, saying that they desired to obey me, but they feared the interdict. I relieved for them the situation by excusing them from farther work "'till I should call them." And I refrained from ringing the call-bell at the usual work hour.

With me were Mrs. Nassau, our child's nurse, my sister, Miss J. A. Nassau, and two native girls, members of another tribe. Nurse was a foreigner, a Christian Liberian woman, who was not amenable to

the interdict. Some of my Christian employees, though not working, remained on the premises. A few visitors came in the afternoon to sympathize; some in sincerity, some to see how we were feeling, and some as spies to see what we were doing. The interdict, except as an expression of ill-will, and a possible check to my mission work, did not trouble me. As to food, I had an ample supply of canned provisions, sufficient for a long siege. In refusing to sell me of their native products the people would miss more than I should. As to work, the cleaning of the premises was not pressing, and could safely be neglected. As to drinking-water, enough could be caught from the roof in the almost daily rains. Food and labour were their own, to refuse if they chose to. But the spring was on my premises, and belonged to me. Refraining from going to it might be deemed cowardice; at least, it would be obeying an order of what Ukuku claimed was a spirit. An order from men I might submit to under compulsion; to submit to this spirit went against my conscience. After prayer and consideration overnight, Mrs. Nassau fully agreed with me that it was right I should make a demonstration at the spring. In parting with her next morning, as I took up a bucket to go to the spring, she knew I might not return alive. A sandy path led through low bushes to the spring, several hundred yards distant. I saw no one on the way nor at the spring. I filled the bucket and was turning homewards, when a spy, armed with a spear, jumped out of his ambush and ordered me to leave the water. As I did not do so, but started to walk over the path, he stabbed at my back. I thrust the spear aside and faced him, but walking backwards all the time. He feared my eye, and did not attempt to stab me in front, but tried to spill the water in the bucket and stab from behind me. But the bucket, and its contents, I guarded as he struck at it from right to left, by rapidly changing it from left to right with one hand and warding off the spear with the other; still walking backwards, and keeping my eye on him, the bucket and I reached the house in safety.

He hastened to the native villages, whence soon I heard a great outcry. A company of Christian natives came in haste, saying that Ukuku was on his way to assault the house, and that they, and other young men, even some who were not Christians, would fight for me against their heathen parents, if I could provide them powder. I supplied them. Then they bade me hasten fasten all doors and windows.

The Mission dwelling consisted of two houses joined by a covered veranda; one, a one-storied bamboo, the other framed of

boards, one and a half story. Mrs. Nassau was in the latter, closing it. Before I had finished closing the former the enemies came, and I was alone in the bamboo house. Shots rattled against the walls. Through the chinks I could see the young men were guarding all entrances, and were firing. I think that, in this difficult situation, defending me against their own people, they purposely fired wide, for no one was even wounded. But their standing armed checked the enemies, who then soon retired. In after years these were ashamed of their assault, and tried to minimize it when it was related to new missionaries by representing that they did not intend to kill me. I accepted that as a kindly afterthought. Certainly, that spy at the spring did intend, and tried hard, to kill me. Certainly, also, their gunshots left their marks on the walls of that bamboo house, and, for aught they knew, had penetrated the thin walls, and might have struck me.

That their interdict had been successfully broken, and that, too, by the aid of their own sons, was a great blow to the Ukuku party. It was the beginning of the end of its power. Four years later, while I was absent on my furlough, the number of the church members having largely increased, two young men, themselves of strong character, and imbued with the courage of my able successor at Benita, deliberately determined to "reveal Ukuku." They walked through a village street openly shouting to the women that "Ukuku is only a man." At once their lives were demanded; but so many of their companions stood up for them, and said to their own fathers, "The day you kil! those two you will have to kill all of us, for we all say also that Ukuku is only a person." Nevertheless the Society met. But when the members looked in each other's faces, each one knew that in voting to put to death the other men's sons he was voting also against his own son. The Society could have dared to kill one or two. But to kill a score! They shrank from it. Everyone thought of his own son thus involved, and the great lie was exposed, and died.

In 1879, on the Ogowe River, at my interior station, Kangeve, near the town of Lambaréné, 130 miles up the course of the river, I had a similar experience with that same Society, known there in the Galwa tribe by the name of Yasi.

In my new work on the Ogowe I pursued toward that Society the same course I had followed with Ukuku at Benita. I preached simply the Gospel of Christ. But it is true that the Gospel touches mankind in all their human relations. I, therefore, was not silent about such sins as slavery and polygamy, any more than I would be

silent about the sins of drunkenness or theft. All these were practices the evil of which, in serious moments, most natives would admit, however much they chose still to persist in them. But witchcraft was their religion; they believed in it. To attack it openly would only offend, and I would lose the personal influence which I was able to exercise in quiet, private discussions. Yasi, though a falsehood, was their government. To attack it would have simply emptied my church of every heathen auditor, and to have debarred any women or children being allowed to receive further instruction. I could wait, bide my time, for the entering wedge of Christian principles to overthrow what I could never have removed by direct onslaught. In conversations with my heathen friends, the native chiefs, in their own houses, when no women or children happened to be present, I would expostulate with them against such a mode of government. I told them I would render them respect and even obedience if, as persons, they should enact laws affecting me as a person, but that I could give neither respect nor obedience to what they knew I knew was a lie. They looked troubled, and replied, "Yes, that's so, but don't tell it to the women." And I did not. Nevertheless, in my untrammelled conversations in the mission-house with my own Christian male employees I was not careful to be silent if our schoolboys happened to be present. And these same employees, in their own dormitories, deliberately and intentionally told the boys of the falsities of their tribal superstitions. They were right. This was Christian principle, working as I desired it should. Inevitably there grew up a generation of lads who began to deride Yasi, and said that they would never join the Society.

There came one day a delegation of them, led by two Christian young men, Mamba and Nguva, asking my permission to play a mock Yasi meeting. I asked them, "Will you dare to play that same play in your own villages?" "No, we would be afraid." "Then don't do here what you are unable to carry out elsewhere. I cannot defend you in your own villages. You are safe here. Wait until you are stronger and more numerous. Just now your play will create confusion." Nevertheless, they did play, with the result of which I had forewarned them. The chiefs were enraged. They "put Yasi" on my house, which meant that I was not to be visited nor sold any food. There was a report, also, that the mission premises were to be assaulted with guns. The loss of food supply was a serious difficulty. I did not need any for myself and sister, nor for the two young missionaries, both of them laymen, who were

visiting me from a sea-coast station, and who could not understand the case in all its aspects, for they had never met with the Society's power; it did not exist at their station, having been broken before they had come to Africa. But how was I to feed thirty hungry schoolboys? I had to send most of them away to their distant homes; down the river; and my canoes returned with a temporary food supply, that they had been able to buy at places on the route where news of the interdict had not as yet been officially carried.

The dozen young men who remained with me I armed with guns obtained from a neighbouring trading-house, and I posted sentinels every night to guard against sudden assault. I went to the native villages and met a council of several of the chiefs. They seemed desirous to keep on friendly terms with myself, but they were angry at their own children. But they took me to task for my warlike preparations. These I told them were for defence; that I would use the guns only when they compelled me to do so. Then they complained that I had taught their children to disobey them; that one of the greatest of God's commands, which I had taught them, was to honour their parents. I said that the Father in Heaven claimed priority even to an earthly parent; and how could children really honour parents who were persistently deceiving them about Yasi, who they knew was only a person? They winced, and looking towards some women who were passing by, said, "Don't speak so loud; the women will hear you." They made another complaint, viz., that I was trying to change their customs; I could keep my white customs, and they would keep theirs. I frankly told them that I would be pleased to see some of the customs changed which were evil, but that neither I nor any other missionary could compel them to change; nevertheless, these customs would be changed in their and my own lifetime. They were terribly aroused and swore, "Never! Never! You can't change them." "No, not I, but they will be changed." "Never! Who can or will do it?" "Your own sons." "Then we will kill our own sons."

They seemed to transfer their anger against me to their own children. The interdict against my house was not formally removed, but it was not enforced. I no longer felt it necessary to post sentinels at night. And secretly—at night—a sister of these very chiefs sold me food for my family. But the heathen rage spread down the river to the villages of the disbanded school children and native Christians. One of these, Nguva, was seized, chained, and offered to Yasi "to be eaten." He was rescued by a daring expedition made by my two lay missionary visitors, who

went in my six-oared gig with my twelve enthusiastic young native Christian workmen. They went fifteen miles down river; were secrètly directed by one of the little schoolboys to the village where Nguva was chained in stocks, assaulted the village at the mid-afternoon hour, when all the men were away, cut Nguva from the stocks, and brought him in triumph to my house. But in the retreat up the river they had for a distance of five miles been subjected to a fusillade of guns from both sides of the river. The river was wide, and they kept in midstream, and no one was injured. But the consequences of that resort to arms made me much trouble after my visitors had safely returned to their seaside station. According to native law I, and not my guests, was held as the responsible party, and it was not satisfactorily settled until some months afterward.

My prophecy came true; less than ten years later little children were playing Yasi as amusement in the village streets. Nguva became an elder in the church. He is now dead. His chain is a trophy in the Foreign Board's Museum, 156 Fifth Ave., New York City.

BATANGA, WEST AFRICA.

THE SOLUTION OF THE PROBLEM OF THE TIDAL BORE.

BY

ALEXANDER BROWNLIE.

The marine phenomenon, the tidal bore, is a sight so very rare to the vast majority of people that, comparatively speaking, it is practically unknown; and yet its appearance is so very extraordinary that, were it known, it would be considered by every lover of nature an object well worth going a long distance to see. It occurs only in a very few rivers, and even in these few it does not always present itself at the time when it is expected. Sometimes it fails to appear—as in the case of the Severn and of the Solway, in Great Britain.

Prof. Geo. H. Darwin noted the fact of the failure in the Severn in "The Tides," and the writer observed the failure in the Solway. In the latter case there was no bore proper; instead there was only a small ripple—so very small, indeed, that an observer upon the shore failed to notice it; but from an upper window its upward progress was barely discernible upon the still, glassy surface of the firth. In a few rivers, however, the bore is permanent, and in two of these it attains very remarkable proportions—that is, in the Tsien-Tang, China; and in the Petitcodiac, New Brunswick, Canada. The former is by far the greater of the two, and is a veritable world-wonder.

Notwithstanding the rarity of this remarkable phenomenon, very little notice has been taken of it by scientists—so far as we are aware—and still less done towards the solution of it; and that little, so far as solving the problem is concerned, seems not only very unsatisfactory, but in some cases very unscientific. For example:

Prof. Arnold Guyot said that, "The bore is due to a struggle between the ascending wave and the opposing current of the stream." Were that theory correct, then bores would occur in every tidal river on earth, for every river current would create one!

Prof. Geo. H. Darwin made several statements with a view to the solution of the problem.

1. In one of his announcements he claimed that:

> It is due to the concentration of energy in a narrow space: when an estuary contracts, the range of tide is magnified.

In answer, it may be said that all estuaries become contracted,

but very few indeed produce the bore. Nor is it true always that tides rise to their highest in contracted places. For instance, they rise much higher in the broad Firth of Clyde than in the contracted strait of the North Channel. "The energy of motion in the narrower space" of the North Channel fails totally to produce magnified tides, because the rise there is exceedingly small; whereas, on the contrary, the magnified tides take place in the wider Firth and in the widest part of its co-tidal basin, the Irish Sea. Yet, it is true that the power abiding in "the energy of motion in a narrow space," when brought into union with the precise conditions which cause the bore, is one of the attending conditions, but only one, and of itself, when standing alone, is utterly helpless.

2. In Mr. Darwin's second announcement he said:

> It would be impossible from the mere inspection of an estuary to say whether there would be a bore there; we could only say that the situation looked promising or the reverse. The capriciousness of the appearance of the bore proves that it depends on a very nice balance between conflicting forces, and the irregularity in depth and form of estuary renders the exact calculation of the form of the rising tide an impossibility. It would be easy to imitate the bore experimentally on a small scale, but we must rest satisfied with a general comprehension of the causes which produce it.

But he himself did not continue to "rest satisfied with a general comprehension of the causes," for afterwards he announced his third, and final, statement—a statement, by the way, of a decidedly revolutionary character compared with the first two and a total departure from the orderly methods of science:

> 3. Whence does this energy come [the energy of the bore]? Now, I say that it comes from the rotation of the earth.

The Tides.

His third attempt to solve the problem comes to us as a great surprise; and, strangely enough, it stands without the support of a single reason, or of an observed fact, to prove it, in "The Tides;" therefore it is merely a personal opinion, and nothing more. But that is not science. Yet, coming from such an authority, we pause to think how the new solvent will act. Were we to concede that the third statement is the correct theory, then we must confess that the rotating earth is able to carry everything along with it from west to east, except the Chinese bore! That it carries onwards the banks and the bottom of the river, and even the atmosphere above it, but not its flood tide! That, somehow or other (no reason given), the flood tide is left behind! It is also quite clear that the

ebb tide is not affected by rotation; it is only the flood tide that is operated by it! Such a singular doctrine seems as if it had been conceived and brought forth in order to explain the *westerly* rush of the Chinese bore. But, as geographical students, we must not ignore the fact that the Canadian bore begins its rush in a *northerly* direction. In like manner, so does the Indian bore of the Hugli. The British bores in the Severn and the Solway travel *easterly*, and the French bore in the Seine travels *southerly*. In fact, to us, tidal bores are known to travel all round the compass; therefore, rotation does not enter into the problem at all. It is all a mistake.

The Bore of the Petitcodiac.

The bore of the Petitcodiac may be seen from one of the wharves of the town of Moncton. When one is perched upon one of these, as upon stilts, more than thirty feet above the bed of the river, towards the time of local low tide, the ebb seems to spend an unusually long time in taking its flight to the sea. In fact, it continues to flow seawards for the extraordinary space of nine hours, and at times even for nine and a half hours; but towards the expiry of that limit the broad river—nearly half a mile wide—becomes an empty river, with its shoals and flats everywhere in sight exposed to view; and in the lowest level there trickles a stream, only a few inches deep. Hence from such a puny rill, as compared with the swift, violent, inflowing tide, one does not get the faintest impression that a struggle between the two is possible.

Nor is it possible. Prof. Guyot, evidently, had never stood on the wharves at Moncton!

Nor is there any capriciousness in the appearance of the bore. It never fails to come. Sometimes the bore-breaker may have a frontal height of five feet, and again its height may be only three feet; but *it* is never capricious in the matter of its coming. When Prof. Darwin made his statement about the capriciousness of bores, evidently he, too, had never been an observer at Moncton!

The tidal bore is absolutely unlike an ordinary tide. It comes suddenly with a rush and a roar. It looks as if the sea had broken loose from its bounds. It can be seen and heard a mile away. Its bellowing, seething mass fills the whole breadth of the channel of the river. Its breaker falls with a crash like a breaker of the sea, for it travels very fast. At Moncton the rate of speed is 8.47 miles an hour—a very high rate for water. But it is not merely a breaker—a detached wave—like a breaker of the sea. It is the front of an inclined plane that rises higher and higher

towards the sea! This is the feature that gives the impression that the sea has broken its bounds. Around the wharves the muddy waters surge and rapidly rise; sometimes the rise may be nine feet in seventeen minutes; at others it may take half an hour to make the same rise, but in any case the whole river is alive with the rushing flood, and soon is brimming full from bank to bank, thirty feet deep, and that in the extraordinarily short space of from three to three and a half hours. In other words, there has been an actual rise of forty-two feet above low-water level at the entrance of the river into the Bay of Fundy.

In our observation of the bore of the Petitcodiac we discern two abnormal local tidal conditions—1, The ebb is exceedingly long and slow; 2, the flood is exceedingly short and swift. These conditions are totally different from the usual tidal conditions of the Atlantic Ocean, therefore wholly local; but both are necessary towards the formation of the bore.

But still further, in connection with the abnormal local tidal conditions at Moncton, we must remember that tides are REGULAR at the entrance of the river. Hence, when tide is low at Moncton, it is half-tide at the entrance of the river—that is, it has risen twenty-one feet there. The river-bed at Moncton lies twelve feet above low-water level at the entrance of the river; hence, at half-tide, the level at the entrance of the river stands nine feet above low-water level at Moncton. In other words, precisely at the time of half-tide Moncton becomes a tidal sink, sunk nine feet below the level of the water in the Bay of Fundy (Cobequid Bay). This difference of level produces the energy of motion, the high rate of speed, and the inclined plane; and at a narrow reach of the river the steepness of the incline is accentuated, resulting in the formation of the bore. The bore does not begin at the entrance of the river, but eleven miles above it. The inflowing flood, however, travels these eleven miles in two hours to a place called Stony Creek. The river then becomes contracted, and the next 8.47 miles to Moncton is made in one hour. The total run of the bore is twenty-one miles. The total difference in low-water level between springs and neaps, and between one set of springs and another, is little more than one foot in summer and still less in winter. The special measurements here quoted are from the Report of Progress for 1899 of the Canadian Tidal Survey, under the superintendence of Mr. W. Bell Dawson, Ottawa. Mr. Dawson also draws attention to an extinct bore in the river Shubenacadie, Nova Scotia:

It used to go up to Maitland, but a change in the sand-bars below Maitland now prevents it; as the tide flows up the river, however, it still breaks occasionally into a ripple.

The silting named has destroyed the sink—one of the precise conditions requisite for the formation of the bore. From all this it follows that the necessary conditions for the formation of a bore are twofold—1, A region of high water-level standing at one end; 2, a deep sink lying towards the other end. These two conditions, of course, are only temporary—looking at them from the point of view of the length of duration of the flood tide—but when they do exist in union, then it follows that the weight and pressure in the region of higher level in a broad estuary must give an enormous energy of motion to the flood tide as it sweeps through the contracted channel into the inland tidal-sink beyond. It is also clear that the higher the region of high sea-level above the temporary tidal-sink, and the steeper the grade of the watery inclined plane, the greater will be the height of the bore-breaker and the faster its speed.

The Bore of the Tsien-Tang.

At the city of Haining the frontal aspect of this bore is a wall of water about one mile wide, ten feet high, and travelling at the rate of eleven miles an hour. This grand phenomenon was carefully observed by Capt. Moore, R.N., and his observations are among the official publications of the British Admiralty. A full account, however, is given in "The Tides," and that account is accompanied by a diagram (Diagram 18), which gives a very striking view of the abnormal tidal conditions necessary for the formation of the bore. Simultaneous observations were made at Haining and at two tidal stations in the estuary—Rambler Island and Volcano Island—but the centre of interest lies between Rambler Isle and the city. At the time of low tide the region round Rambler Isle becomes a tidal sink sunk three feet below the water-level at Haining and ten feet below the water-level at Volcano Isle; hence tides flow towards it from both places simultaneously at that time. The total rise of tide at Rambler Isle is given at twenty-three feet, and when tide is high there it is low at Haining—the distance between the two places is twenty-six miles. The total rise of tide at Haining is eighteen feet, and that rise is made in the very short space of three hours. (Precisely the same condition as in the case of the bore of the Petitcodiac.)

The tidal differences at the three stations are the following:

Tide falls 1 foot below mean sea-level, and rises 6 above, at Volcano Isle.

Tide falls 11 feet below mean sea-level, and rises 12 above, at Rambler Isle.

Tide falls 8 feet below mean sea-level, and rises 10 above, at Haining.

The total rise of tide is 7 feet at Volcano Isle.
" " " 23 " Rambler Isle.
" " " 18 " Haining.

From all this it is quite clear that when tide is high at Rambler Isle and low at Haining the slope of the watery inclined plane between the two places has a grade of twenty feet in twenty-six miles—a very steep grade indeed for sea-water. But within the limits of these twenty-six miles the boundaries of estuary and river become greatly contracted, and in the contracted region the angle of the slope becomes enlarged, and at the same time there occurs an increase in the energy of motion and of pressure. Hence, by reason of all this, when the accentuation in the inclined plane becomes too great to maintain the form of the plane, the frontal waters fall forward into the form of the bore-breaker.

The Tsien-Tang possesses the two prime conditions requisite for the formation of the bore:

A. The region of twenty feet high level, when tide is high at Rambler Isle.

B. The region of sink, when tide is low at Haining, sunk twenty feet below the high-water level at Rambler Isle.

These two conditions exist at the same instant of time. The opposition of the high level to a contiguous low level is always present at that instant of time; they are absolutely inseparable then. Hence the appearance of the bore is a necessary result of the opposition; and it likewise follows that this bore must have a greater frontal height, and an accelerated speed, because of its larger proportions, than that of the Petitcodiac. As is the sharpness of the angle of the inclined plane, so is the height of the bore-breaker. At Haining Capt. Moore estimated that one and three-quarter million tons of water passed the point of observation in one minute. The frontal height of the breaker is said to be higher now than it was during the Taiping rebellion, suppressed by the late Gen. Gordon. If that report is correct, then the swish of the awful current of this tremendous bore has dredged the sink deeper since that war.

With regard to the bore of the Tsien-Tang, Prof. Darwin made the singular remark, in "The Tides," that "There is no bore down stream." Of course not. A bore in the ebb tide is unknown there, and impossible, for the simple reason that the conditions are absolutely wanting at the time of ebb to form a bore. At that time the inclined plane stretches in one long, flattened plane from Haining to Volcano Isle, a distance of seventy-seven miles; and at the top of that plane there is no great region standing at high-water level, nor is there a region of low-water level at the bottom—a tidal sink—because at Volcano Island the extreme rise, or fall, is only seven feet.

It is now several years since we came to perceive the true cause of the bore, and only then after a visit to the Petitcodiac and a close study of its tidal conditions. By the fresher data of Capt. Moore—given in "The Tides"—and by a study of Mr. Darwin's elaborate diagram therein, we felt assured that our conclusion regarding the conditions which cause the bore was founded upon well-ascertained scientific facts, therefore the correct solution of the problem; and the only solution founded upon correct tidal observation, so far as we are aware.

July, 1901.

GEOGRAPHICAL NOTES FROM THE YEAR-BOOK OF THE DEPARTMENT OF AGRICULTURE FOR 1900.

BY

ALBERT PERRY BRIGHAM.

This is a volume of 888 pages, and contains several papers of importance, not only to the farmer, but to all who are interested in the development of our national domain.

Three points may be specially selected from the report of Secretary Wilson, with which the volume begins. These relate to Forestry, Roads, and Irrigation. In regard to the first, Secretary Wilson says that public interest is growing with unprecedented rapidity, and that the calls for advice from planters and lumbermen far outrun the ability of the Division of Forestry to meet them. Similar is the case with the Office of Public Road Inquiries. More sample roads were built in 1900 than in any previous year, and the interest is widespread. Also, a report now in preparation on eight streams of California is believed to be

> the largest and most comprehensive inquiry regarding irrigation laws, customs, and conditions which has been undertaken in this country.

Reference will now be made to some of the most important essays of the Year-Book.

Forestry.

Two essays deal with this subject. One discusses forest extension in the Middle West. The object is to show that planting will be profitable, and to suggest plans of procedure. It is stated that a ten-year plantation of catalpa in Kansas now shows a net value of $197.55 per acre. Great destruction of the native trees has taken place in the region. The more extensive remaining forests are in Arkansas; but these are rapidly disappearing. There is growing call for fence posts, railroad ties, and telegraph poles, and they are even now often worth more than it costs to grow them. The telegraph lines of the United States require 600,000 poles annually, and 90,000,000 railroad ties are needed each year for renewal. There is also needed lumber for furniture, implements, and vehicles, and 500,000 acres annually planted in the Middle West would not meet the needs. The Division of Forestry stands ready to examine land,

and to plan and oversee the work without charge to the planter. This is done through occasional visits of a forestry officer.

The other paper is devoted to practical forestry in the Southern Appalachians. There is already a serious reduction of the timber by improvident methods. Here are important problems for Western North Carolina and Eastern Tennessee, where there are one hundred kinds of native trees. The losses are due to leaving to rot trees of unsound base, to poor judgment in sawing, to high stumps, and to careless felling, causing lodging and crushing of saplings. There are two classes of forest. The first has suffered from cutting, from fires, and from grazing. Such forests need removal of worthless kinds, as on the Biltmore estates, where 3,000 cords of firewood are cut each year, to the improvement of the woodlands. Cattle should be kept out, and fires checked. The second head includes the higher mountain timber, in which diseased or overripe trees should be removed; enough trees should be left for density, for seed, and to provide for repeated crops of the best timbers.

In an appendix it appears that thirteen States have offices for forest work. There are twenty-one forestry associations, of which four are in California. We have three schools of forestry: the Yale Forestry School, giving a graduate course of two years; the New York State College of Forestry at Cornell University, with a four-year course and 30,000 acres of State forest as a demonstration area; and the Biltmore School of Forestry in North Carolina. Forty-eight other institutions offer more or less instruction in the subject.

Roads and Road Making.

Here we find two essays. One sets forth the best ways of making mountain roads. Mineral deposits have led to the making of all such roads west of the Missouri River. Everywhere the loss from the use of bad roads would in five years construct good highways for the carting of ore, fuel, provisions, and timber. There is an interesting account of the road grades suited to various traffic. A four per cent. road (4 feet in 100) is the maximum for pleasure driving. Twelve per cent. is the highest permissible grade for freight, and eight per cent. is much better, and usually practicable. A fifty per cent. greater load can be hauled by a team on an eight per cent. than on a twelve per cent. incline. The rest of the paper is given to the more technical matters of construction.

Selection of Material for Macadam Roads is the theme of a paper by Mr. L. W. Page, Expert in Charge of Road Material Laboratory—

an official title that is suggestive of great recent progress in this field. Credit is given to bicycle organizations, to the adoption of horseless vehicles, and to the awakening of our farmers to the value of easy transportation. Hardness for resisting wear, toughness for resisting fracture, and the binding or cementing quality are shown to be the needed properties of road rock, and these must be adapted to the bulk and kind of traffic. Urban, suburban, highway, and country road traffic are shown to vary in important ways in the strain put on roads, and thus the need of expert work appears in this as in other departments of practical science. Laboratory tests of road-material have been made in France for thirty years, and their value is demonstrated. In this country such laboratories are organized in Johns Hopkins University, Columbia University, Harvard University, Cornell University, the University of California, and the Wisconsin Geological Survey. The laboratory in the Department of Agriculture will test, free of charge, road material for any resident of the United States. Before a report is made the laboratory requires a record of the traffic on the roads to be maintained, and expert advice is then given. The National Good Roads Association has its headquarters at 928–929 Marquette Building, Chicago.

Introduction of Foreign Fruits and Grains.

Four papers are mainly occupied with this theme. One relates to Smyrna Fig Culture in the United States. Elaborate experiments have sought to secure the fertilizing of these trees by means of a fig insect imported from the East. It is a promising industry for the interior valleys of California, also for the fruit-growing parts of Arizona, New Mexico, and Texas. Experiment stations in Louisiana and further east are urged to give the subject their attention, the Smyrna fig being vastly more valuable in the market than the California fig. The aim is to supply the place of importations, now amounting to several hundred thousand dollars per year.

We have next the date palm and its culture. Yielding in importance only to the Smyrna fig and the Zante currant is the importation of this fruit. The requirements are: plenty of water for the roots, and a hot, dry atmosphere for the leaves, and winters not too severe. The tree will thrive as in Florida, where the summer is not dry enough nor hot enough to mature the fruit. It is the chief product of the Sahara region, and it is grown commercially at a single point in Southeastern Spain. There have been sundry attempts to naturalize the date palm in this country from the days

of the early Spanish missionaries in the South West. These led to the importation, in 1900, of a quantity of shoots of the best dates of the Algerian Sahara. Experiment is in progress with most of them at the University of Arizona, a few being sent to the University of California. Temperatures below 20° F. are likely to be injurious or fatal, and the fruit will not ripen unless the mean temperature goes above 80° for a month in the summer, with a mean of 70° from May to October. The soil, on the other hand, must be moist, but for arid regions the plant has the great advantage of thriving on very alkaline soils. Orchards come to bearing in six to eight years. A single tree in Arizona, eight years from the seed, bore 400 pounds of fruit in a season. The valley of the Colorado River, the Colorado Desert of Southeastern California, and the central valley of California are the most favourable regions for this fruit. The Colorado Desert is deemed the best date region in the New World. It would be a fact of high interest if this region of fearful heat and great aridity could be so watered as to grow rich with this Old World fruit. The Arizona region is discussed at some length, and the prospect of growing our own supply of dates is held to be good.

A third article discusses successful wheat-growing in semi-arid districts. The author notes the fact that in certain parts of Kansas emigrants from the cold and dry parts of Russia have reared crops when others failed. With a rainfall under thirteen inches, the lower Volga district is one of the chief wheat regions of Russia. Such precipitation means aridity, being several inches less than in the semi-arid belt of the Great Plains.

Increase of the crop in this region is to be gained by selection of hardy varieties and by proper methods of culture. The hardiest sorts of Russian wheat are likely to succeed in the West, especially those called the maccaroni wheats; and to this end much experimental proof has now been gained. The essential in culture is to conserve the moisture. By such care, and by rigid selection of the hardiest plants, the author believes that our winter wheat area "may be extended northward almost indefinitely."

A fourth paper of great value is devoted to commercial plant introduction in general. The present efforts in this direction derive additional worth from the consideration that our native plants, some grasses, and forest trees have played an unimportant rôle in the agricultural development of the land. The Department seeks chiefly to secure adequate experimentation, to prevent introduction of plant diseases and noxious insects, and thus to promote economy

and safety. A single important case of recent years is the importation of Kafir corn, of which 600,000 acres are now planted in the single State of Kansas.

Another recent importation is the Kiushu rice, from Japan, now grown in Louisiana and Texas, and very superior, in that it does not deteriorate, and is so hard that it does not break in milling. Many other illustrations of recent importations of great value will be found by the reader of the article.

Free Delivery of Rural Mails.

This subject is given place as of special interest to the farmer. The growth of the system has been rapid, from 44 routes in 1897, 128 in 1898, and 634 on Nov. 1, 1899. By June 30, 1900, the number was 1,214; and Nov. 1, 1900, 2,551 routes were being served. It is shown that the growth of the system will not be a burden upon the postal service, but will even become a source of profit. The history of the movement is outlined, its advantages are discussed, and the personal verdicts of a number of farmers as to its operation are given. Prompt receipt of market and weather reports, closer contact with the world, with greater intelligence and interest in rural life, are the chief advantages set forth.

FIORDS.

BY

GEO. D. HUBBARD.

INTRODUCTION.—ON THE SCOPE AND MEANING OF THE TERM.—*Fiord* is borrowed into English from the present Norwegian *fjord*, which has developed from an earlier form, in* Old Norse *fjorðr*, and is now applied to the long, narrow, deep arms of the sea which occupy the distal portion of deep, steep-walled, rock channels on the western coast of Norway. The English word *forth* and the Scottish *firth*, applied to quite similar embayments in different parts of the British Isles, also the English verbs *fare* and *ferry*, have developed from the same root. The primitive Indo-European root $\sqrt{par}$, from which these several words have sprung, has, in general, the meaning of "motion forward," "passing over" and then "to travel." Possibly the word in its early form was given to the fiords from the fact that the settlers along the sides of the fiord found it nearer to go across than to go around. A significant fact comes out here in relation to Norway's commerce and her coast. Fifty-three per cent. of the boundary is water, and forty-seven per cent. is land where the country backs up to Sweden; but ninety-five per cent. of all Norway's export trade goes out over the water boundary. No wonder the idea of travel and crossing over is in the name given to fiords.

The derivation of the word is quite certain, but the present meaning is in some confusion. This confusion has arisen from three sources—

(*a*) The term has been used both in a technical and in a popular sense. This is legitimate, and may be continued, as is done with multitudes of scientific words.

(*b*) It has been used with three distinct meanings—1st, embracing only the water; 2nd, including both water and containing walls; and 3rd, the walls only.

(*c*) Fiords, like other physiographic types, grade into related forms bearing different names. This source of confusion cannot be avoided; but the perplexity can be overcome in part by recognising its source. Many of our terms do not admit of exact limi-

* I am indebted to Prof. W. H. Schofield of Harvard for these notes on derivation.

tations at present, and others which might be so limited never have been.

Examples of the three types of definition for *fiord* follow. Penck* illustrates the first:

> Typical examples are long, slender, much-branched bays which extend inland often over 100 km.

Geikie† uses the second type:

> A fiord is a long, narrow, and often singularly deep inlet of the sea which terminates inland at the mouth of a glen or valley. . .No line of demarkation can be traced between the water-covered portion and that beneath the sky.

Here the author starts with a definition of the first type; but the closing sentence and the context show that he really holds the view of the second type. LeConte‡ employs the third type:

> Fiords, then, are deeply-eroded land valleys—usually half-submerged glacial valleys.

These quotations are merely types of classes. Each type could be duplicated several times, and occasionally two types can be found in the same book.

The dictionary study of the word has revealed an interesting series of definitions. From Webster's editions, beginning with a small book and passing through a series increasing in size and comprehensiveness, the following were taken:

Webster's Abridged:	Fiord,	an arm of the sea; a bay.
" Condensed:	"	a bay or inlet with high banks.
" Academic:	"	a narrow inlet of the sea between high rocks.
" Collegiate:	"	a narrow inlet of the sea between high banks or rocks.
" International:	"	a long, narrow inlet of the sea having precipitous walls.

Not one of these definitions defines sufficiently to exclude embayments, which are never considered to be fiords; nor do they call attention to several of the essential characteristics of fiords.

Worcester's Comprehensive Dictionary gives, as equivalent to fiord, these terms:

> (*a*) Firth; (*b*) a rock-bound strait; (*c*) a frith; (*d*) a strait of the sea; (*e*) an estuary.

What idea of a fiord will a student get from any or all of these definitions? And yet why condemn the dictionary? How can a lexicographer be expected to be able to define a scientific term which specialists have failed to delimit? It seems plain that the

* Morph. der Erdoberfläche, 1894, II, 563.

† Textbook of Geology, 1893, 291.

‡ Elements of Geology, 1891, 574.

best way to establish a clear definition of *fiord* is to observe carefully forms acknowledged by all to be fiords, to note all their common features, and from these to deduce a definition. Then, by comparison, related forms and those so ill-defined by nature as to be questionable can be put where they belong.

SECTION I—A DISCUSSION OF THE CHARACTERISTICS OF FIORDS.

Fiords are features of the coast of Norway. This all will grant. Greenland, especially on the western side, has fiords; northwest Scotland and northeast Labrador also have them. Features common to fiords of all these regions will certainly be accepted by everyone as fiord characteristics. An arm of the sea lying in a channel of peculiar form, then, is a fiord, and it becomes our task to describe this channel and to discuss its relation to the water. Both where occupied by the water and inland from the head of the water this channel is broadly U-shaped, or trough-shaped, comparatively uniform in width, and often nearly straight. The ratio of length to breadth of the water-covered portion varies. An average is about 30:1. This portion is frequently 75–100 miles long. The water may occupy only the outer portion of the channel, or may extend over a half, or even all of it; in the latter case sometimes terminating in a cirque. The channel is always deep, and the water within is of considerable depth, frequently exceeding several times that of the foresea at the mouth, and equalling one-half the average width.

Steep, smoothed walls of bare rock are features very striking and constant. The slope of the wall suffers no change at the water's edge, but continues steep to the bottom. It may be of nearly the same steepness from summit to base, or the descent may be in huge steps, or with a steep section in the upper part and a gentler slope towards the bottom, or the reverse. One may frequently sail along a fiord an hour or more without finding a possible landing, so precipitous and continuous are the walls. The average inclination of the walls of the fiords of Europe has been given as 35°. This, of course, includes many of much lower angle than the more typical ones. In order better to realize the steepness even of this angle, recall the fact that skilled mountain-climbers consider an ascent of 37° scarcely climbable unless it be clothed with vegetation. The channel walls are usually sub-parallel and nearly straight, and the straightening and smoothing seems to be the result of recent changes. There are marked differences between the fiord channel and the valley of a stream. In the sub-mature river valley, in

strong relief, spurs run out into it some distance, standing as buttresses against the walls; and in young valleys, as seen looking up or down stream, the spurs seem even to overlap, entering alternately from one side and then from the other. But in a fiord channel such spurs are of rare occurrence. The appearance is rather that the spurs have been brushed off, leaving a steep wall.

The floor of a fiord is somewhat uneven. It does not have a continuous slope from the head seaward, but it may be very far below the surface of the water in the middle part, and near the surface toward or at the mouth, thus making a great, much-elongated basin. It frequently happens that beneath a single fiord there are two or several of these basins separated by sills or swells where the floor approaches the surface. Transversely, each depression is broadly U-shaped, or trough-shaped, with steep descents on either side and a very low gradient across the bottom. Longitudinally, the elongated depression gradually shallows from the maximum depth toward either end. The floor gradient, local as well as average, is greater seaward than landward. In Sögne Fiord, Norway, the mean floor gradient from the deepest part to the mouth is 62 minutes; from the same depth to the head it is 39 minutes. A mean floor slope for an entire fiord of 6° to 7° is very rare, but for individual basins slopes may often be much more. Little regularity of form exists among the depressions or basins.

As mentioned above, sills transverse to the channel rise between the basins in a very peculiar manner. A few soundings from Sögne Fiord and others will show something of their form. At the mouth of Sögne the floor rises in a sill until the water is but 180 metres deep above it; while the maximum depth several miles inland is 1,242 metres. Loch Hourn, Scotland, has four basins, whose depths are respectively 18m., 49m., 38m., and 49m., while the sills between them lie beneath from 1 to 13m. of water. The freshness of the surface water and the constancy of the water temperatures in the basins at all seasons of the year are good evidences that the sills form barriers completely across the channel. In many cases the sills are known to be of bare bed-rock; while in some, as at Loch Hourn, they are known to be covered with deposits of loose material. As a rule the channel widens where the sill occurs, and narrows in the deepest places. Many fiords become much deeper where they receive a considerable tributary. In the bends of fiords the deepest part of the channel is not in the centre, but is near the outside of the curve.

The channel in which the fiord lies usually extends some distance

landward beyond the head of the fiord and rises to the level of the highlands in the interior. The floor and walls show no change of character at the end of the fiord, but the floor rises by more steep and less steep reaches, or by huge steps, with basins on the tread, or by a gentle incline, with swells rising occasionally transverse to the channel; while the walls continue unchanged in their main features. They are steep, sub-parallel, smoothed and scratched as in the part of the channel occupied by the water. Lakes often lie behind the swells in this upper part of the channel, like a row of shining beads, sometimes several on one string. By the overflow of the lake the sill is sometimes cut through, exposing a section. Usually the sill, thus exposed, is of firm bedrock, but occasionally it is of drift.

Many lakes, having similar rock basins of great depth, and walls like those of fiords, occur on the eastern slope of the Scandinavian mountains. These lakes and their associated channels are so strikingly like the fiord channels on the western side of the mountains that one writer has enthusiastically remarked:

> The Swedish slope of these mountains would become a fiord coast if the piedmont were covered by the sea.

Likewise, if the sea washed the eastern slopes of the mountains of New Zealand, of the southern Andes, and of the Scottish Highlands each region would possess a fiord coast. This is equally true of the slopes of the Alps. Nordenskjöld* says that most fiords and up-valley lakes have rock basins. If these channels containing lakes, and those without lakes, but in the fiord and lake regions, were occupied with water, they would be as much fiord channels as any along the present coast.

The upper parts of many fiord channels in Greenland, Norway, and Alaska are at present occupied by ice tongues, some reaching to the water's edge and, as Russell thinks, far out into deep water, but creeping on the bottom because too thick to be floated.

The fiord channel not only extends landward beyond the head of the fiord, but sometimes leads out across the continental shelf a considerable distance. Here, too, it maintains the uneven floor as in other parts. There is usually a very marked rise of the floor to form a sill across the entrance to the fiord. Fiord channels are sometimes connected, especially in the distal portion, by cross-channels. These, when occupied by water, make cross-straits, called sounds in Norway, and partake of the nature of the fiord in every way, but are never deeper than the fiord. Where their num-

* Bulletin Geol. Inst. Upsala, 1899, 4, 220.

ber is great the number of off-shore islands is great, and the latter form an island belt or zone of large and small rocky islands, arranged in no apparent order. The outer mouth of the fiord lies at the seaward margin of this belt, and the inner mouth at the landward edge of it. This belt or field of islands, called in Norway *Skjaergaard*, is more fully developed along coasts of weak relief.

Many lateral streams which enter fiord channels do so from discordant high-level waterways—*i. e.*, they come in high up on the walls of the master channel, giving the impression that the latter had been cut much deeper than the former. For these lateral channels, with high-level discharge, Gilbert has proposed the name of *hanging valleys*. Their waters descend by steep rapids, or by a series of cascades, and occasionally by taking one grand leap from a height of several hundred feet to the fiord below, clearing the wall in such a manner that boats can pass between the falling water and the rock. The discordance of the side-valley floors with the master channel floors is a very constant feature in fiord regions. Sometimes the former is many hundreds of feet above the surface of the fiord, sometimes it is below; but even then soundings may show that if the water were withdrawn from both, the lateral would appear as a hanging valley with reference to the main channel. Near the mouths of fiords some of these high-level side channels lead downward away from, instead of towards, the master, which is a strikingly peculiar feature. Observation goes to show that this is not at all uncommon along coasts possessing fiords. They have the appearance of distributary channels, and may be so called. Any theory for the origin of fiords must take into account these relations of side streams and valleys in order to explain the fiords. Several other characteristics have been noted by different authors; but they prove to be rather uncommon than common, hence cannot be called characteristics. Among them may be mentioned a tendency of fiords in some regions to be sub-parallel to each other and at right angles to the coast.

Summary.

From the preceding paragraphs it may be seen that certain features of fiords and their channels are much more constant than others; many features vary in form, others are sometimes wanting. The more constant ones, then, may be called the essential features, and the others variable or secondary features. (*a*) The inequality in the relief of the channel floor is constant; but the form of the basin, the number of basins and swells in one fiord, and the depth of the water over the sills, are all points which may vary. (*b*) The walls

are of rock, high, steep, and smoothed; but the degree of steepness and smoothness and the height vary through a wide range. (*c*) The channel continues landward from the head of the fiord comparatively unchanged; but it may extend a long or short distance; it may or may not contain fresh-water lakes or an ice-tongue. (*d*) Commonly, the channel does not extend out beneath the fore-sea, but is closed by a swell. (*e*) High-level lateral valleys pouring their streams into the fiord over the edge of the fiord walls or through a high notch are constant peculiarities; but these hanging valleys may vary in height from a few thousand feet above the surface of the fiord to some distance below the surface. Toward the mouth of the fiord the high-level branches may lead away from the master as if they were distributary channels. (*f*) Sounds or straits and islands occur along the shores of fiord coasts. They may be many or few, small or great. (*g*) Parallelism of fiords and their direction relative to the coast are features much modified by the regional topography and rock resistance; hence they cannot be emphasized as characteristics.

As a conclusion to this section are presented three forms of a definition for the word "fiord." It is hoped that they will be sufficiently substantiated by this and other descriptions to give them general acceptance. Each conforms in length to the usage of a recent, established type of dictionary:

COMMON SCHOOL SIZE: Fiord, a long, deep, uneven-floored arm of the sea.

ACADEMIC SIZE: Fiord, a long, deep, uneven-floored arm of the sea, entering a region of strong relief.

UNABRIDGED SIZE: Fiord, a long, deep arm of the sea, occupying a portion of a channel having high steep walls, a bottom made uneven by basins and sills, and with side streams entering from high-level valleys by cascades or steep rapids.

SECTION II—ON FIORD REGIONS AS A TYPE OF COAST: A COMPARATIVE STUDY.

Besides Norway, Scotland, Greenland, and Labrador several other regions furnish excellent examples of fiords, among which are western British America and southern Alaska, the Chilian coast, South Island of New Zealand, and many islands in each polar region. The coast of Maine and most of the land bordering the Baltic Sea and its entrance have fiord-like forms which depart materially from the typical examples previously described.

Berghaus* and others have studied these regions as types of coast, and have mapped them under two or three distinct types.

* Physical Atlas, 1892, Map 19.

In Maine the relief is weak; the embayments are not bounded by steep, high, sub-parallel walls, but by gently rising walls of moderate height, which contain between them an inlet rapidly widening seaward. The maximum difference of floor relief is not over 30m., but there are often distinct basins and sills. In the Baltic Sea and along Denmark coasts are many embayments differing locally from each other, and as a group, from the fiords of Norway, and yet presenting so many similarities that some authors class them as fiords, while others, more conservative, call them fiord-like features. The names *fiärden*, *shären*, and *föhrden* have been given to them, each for a distinct type of form. The first term is applied to embayments in regions where there are few islands, and *shären* is used for the passages and straits where the coast is much dissected, hence abounding in islands and rock reefs, but with very few embayments. Any map on sufficiently large scale will help to locate the regions having each type. The embayments called *fiärden* are narrow, tortuous sea arms, with some shallow basins, best developed where up-valley lakes intercept the sediments. Channels in both *fiärden* and *shären* types are not deep; the walls are low and rise at a small angle. The relief of the lands is weak, only a few hundred feet where strongest, usually much less. Weak relief of lands and little depth of water seem to go together. The *föhrden* type of embayment occurs on the eastern coast of Denmark, and along the coast of Sweden near Cimbrishamn. The relief of the land is weak, and the water in the channels is shallow. The form of the embayment varies much. Some are narrow and intersect, forming a net; some are very tortuous, and others are sack-shaped, broad within and constricted at the mouth. Local depressions or basins occur in some of these bays, and in one or two cases a sill is known at the entrance. Since a good ship channel goes to the head of the inlet, and the water is not too deep for easy anchorage, while the walls are not so steep as to interfere with landing, *föhrden* make excellent harbours.

The relation of these three forms to typical fiords has been generally overlooked. The most pronounced differences between the true fiord and the fiord-like forms are in the height and steepness of the walls and in the depth of the water in the channels—differences probably due to the weakness of relief on the coasts exhibiting the fiord-like types. The next section will give additional material on the forms.

(*To be continued.*)

SOME ECONOMIC ASPECTS OF THE HEAT AND DROUGHT OF JULY, 1901, IN THE UNITED STATES.

BY

ROBERT DE C. WARD.

Large sections of the United States east of the Rocky Mountains suffered from a prolonged spell of extreme heat and of drought during the latter part of June, and in July, of the present year. Meteorologically, medically, and economically, great interest attaches to this heated term. The meteorological and the medical aspects of the question are likely to receive the most attention. It is the purpose of this article to point out some of the ways in which this remarkable spell of weather affected trade, industry, and finance. The sources of information have been the weekly *Climate and Crop Bulletins* of the Weather Bureau, and the well-known trade journals, *Bradstreet's* and *R. G. Dun and Co.'s Review.* The first-named publication distinctly emphasizes the meteorological side; the two journals last named aim to present a true statement of trade conditions without any special prejudice in favor of meteorological controls.

Summarizing, in a very general way, the meteorological characteristics of this hot spell, it may be said that the excessive heat began during the last days of June, and continued with but little relief, except locally, to the end of July. Record-breaking maximum temperatures were observed at a large number of stations, readings of 100° and above occurring in many places for several days in succession during part of the month. The daily temperatures were quite commonly well above the average, the excess frequently reaching 5° to 10°, or more. During this prolonged spell of hot weather the rainfall was markedly deficient over many sections east of the Rocky Mountains, and hence there resulted a drought of far-reaching extent.

The crop conditions were, on the whole, satisfactory until about the middle of July, when corn began to show the injurious effects of the excessive heat and drought in the southwest. Locally, some damage was done to wheat and some to oats; while cotton also suffered more or less from drought over considerable sections of the cotton States. Occasional local rains—as during the weeks

ending July 22 and 29, for example—helped to make good a part of the damage to corn or cotton which had been caused by the drought. The chief interest, so far as the crops were concerned, centred in the condition of corn.

One effect of the extreme heat upon general trade was observable at the very beginning of the hot spell, in June, and continued more or less distinctly as a characteristic of the four weeks of July. This was a marked stimulation of retail trade in seasonable goods, *i. e.*, light-weight clothing; "white goods"; straw hats; outing shirts; summer shoes; sporting goods, and the like. So emphatic was this control that the distinguishing feature of the retail trade during more than one week was the "very large distribution of all classes of summer goods, induced by the hot spell." Another interesting point in this connection was that the continuance of the intense heat over much of the country had the effect of carrying the sale of summer goods beyond the usual time; of leading to "considerable re-orders for summer wear" from wholesalers, and thus of stimulating trade along these lines until late in July. Towards the middle of the month there was, on the whole, something of a general adjustment of business to the conditions of intense heat which had already prevailed for more than three weeks, as is reflected in a report from St. Louis, to the effect that business interests were "resolutely adapting themselves to conditions over which they can have no control."

Besides the stimulating effect of the hot weather just referred to, another effect—and this an unfavorable one—was emphasized from week to week in many of the trade summaries from different cities within the districts of intense heat. This was the curtailment of almost all branches of trade other than that in summer goods. This depressing influence is clearly described in a report from Boston, July 6, to the effect that "buyers have been few, and only necessities have prompted purchases;" or again, in another report from a later week, that owing to the limited stocks of dry-goods on hand considerable shopping on the part of buyers to find requisite supplies was necessary; "and with the daily temperature well up in the 90's this is something most buyers declined to do." That "shopping" was decreased by the heat, and that goods were ordered by mail instead, was a natural result of the torrid weather conditions, and was clearly brought out in a number of cases. The emphatic statement from Memphis, July 12, to the effect that business was "held in check by drought reports," and the one that "torrid weather conditions depressed retail trade in all lines," are

representative of many trade reports from city after city for two, three, or even four successive weeks in some cases. Intense heat, however, is not necessarily adverse to general retail trade, provided there are favorable crop prospects. This is clearly brought out in such reports as one from Chicago, where, in spite of the heat then prevailing, sales of fall goods were enlarged owing to favorable crop reports, and one from St. Louis, where the country trade was "sustained by the result of the wheat harvest." On the other hand, again, trade may not respond immediately even when crop prospects are good; for when the weather is fine and farmers are busy harvesting, they have little time for trade, which slackens in consequence. Thus, Minneapolis reports on July 12 that less merchandise was being shipped by jobbers, because the farmers were "taking advantage of the fair weather to finish their work and did not have time to get into town."

A study of the special characteristics of the weather over different sections of the country from week to week brings out details of great interest. Thus, during the second week of July, for example, business was reported as of a "midsummer character," *i. e.*, normal, in the east. This is certainly partly explained when we learn that the temperatures for the week were nearly normal, or were slightly lower than usual, over many of the eastern States. Reports of a marked improvement in trade came from a number of cities situated in districts where the temperatures for the week were not far from normal. The statement from Louisville is fairly representative: "A few recent days of nominal summer weather have given a spurt to retail trade." During the same week in the southwest, however, trade conditions were adversely affected by drought and hot weather, "which superinduced a tendency on the part of many to cancel orders previously given." The third week of the intense heat and drought thus affected not only the trade of that particular week, but led to the cancellation of orders given in previous weeks. These cancellations were chiefly of orders for agricultural implements, dry goods, hats, and foot-wear; they came from the districts of the Southwest or the South where corn or cotton had suffered severely from the drought, and they continued to come in as long as the drought lasted. This was naturally a disturbing factor in the trade conditions of many Western and Southern cities.

The heat of the first week of July "caused a practical suspension of industrial activity in many cities." "Numerous prostrations from heat caused humane employers to close their mills

during the most distressing hours, thus bringing about some restriction of business." At Pittsburg all the mills were "badly crippled by the hot spell," and similar reports came from Boston, Philadelphia, and other cities. Steel, tin-plate, and cotton goods were noted as especially affected by these shut-downs. In close connection with these voluntary shut-downs on the part of employers comes the effect of the hot weather upon the strike of the steel-workers in Pittsburg, one of the trade journals reporting that the striking employés were "mostly content to take a rest during the hot weather," and consequently were not so anxious that a settlement should be reached. *Bradstreet's* of July 20 makes an editorial comment regarding the strike which emphasizes this point still further. "The present strike situation," says that journal, "suggests several reflections. It would be easy to magnify its importance if account were not taken of the fact that the present movement is coincident with the time of the year when a heated spell exerts its effect upon the imaginations of men ordinarily regarded as calculating, and when holiday-taking is the rule."

The week ending July 22 brought local showers over portions of the drought-stricken districts; and although these showers were in most cases but scattering, and much more precipitation was needed to repair the damage already done by the drought, there was a noticeable improvement as regards crop outlook and business in the sections where the rains fell. A characteristic report from St. Louis, July 19, stated clearly enough that "the business situation hinged upon the question of rain." On the same day New Orleans reported, "There is evidence of a more healthy tone pervading all lines of business as a result of frequent rains." At Baltimore, however, trade reports note that the rains had been excessive in some sections, and business had suffered in consequence.

The week ending July 29 gave "good rains in the spring-wheat and northern corn-belt . . . [which] caused reverse movements and the growth of a better feeling." "Advices of lower temperature and moderate rains came as a great relief to business throughout the country"; "needed rains in Texas and the Gulf Region, and hot weather and rains in the South Atlantic Region . . . improved cotton-crop advices and trade reports in those regions."

The cattle, meat, dairy and produce markets all showed marked effects of the excessively hot weather, which was naturally "a disturbing factor in markets for perishable goods." At the very beginning of the hot spell the perishable nature of butter and eggs

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caused a rise in price, which was well maintained. The shortened supply of milk, due to the drought, was another factor in advancing the price of butter, and also caused the shut-down of a number of sugar-of-milk factories. Fruits and vegetables became scarce throughout the drought-stricken districts, and advanced in price. Fruits were in some cases reported as dried on the trees. Because of the inferior quality, scarcity, and high prices of fruits and vegetables there was a great demand for canned goods, the prices of which at once tended upward. Had it not been for the drought, the year 1901 would probably have been a very poor one for packers and jobbers of canned goods, because a very heavy supply had been carried over from the previous season. At Boston the shoe and leather market at the end of June showed an advance in hides, partly "on account of the smaller number coming into market as a result of the decreased sales of fresh meat during the heated term."

The drought and consequent lack of pasturage in the Southwest led to record-breaking shipments of cattle and hogs to market at Kansas City. This rush to market began early in July, and the receipts at Kansas City for the month exceeded those of July, 1900, by 263,000 head. The cattle were not shipped because the market invited them, nor because the stock was in the best condition, but simply because of the inability on the part of the stockmen to feed the animals. This extraordinary rush of live stock resulted in an over-supply of young cattle. The market was so overstocked that buyers dictated prices—a fact which operated to the advantage of the packers. The situation in the hide market was much complicated, and tanners were helped to hold down the price of hides. Smaller requirements in the way of corn for fodder, and restricted subsequent arrivals of cattle, were expected. Throughout July the prices of live hogs and of pork products were much affected by the price of corn.

Of all the economic aspects of the heat and drought of July the greatest interest attaches to the prices of stocks and cereals. During the first few days of July the "oppressive weather conquered option traders to such an extent that speculation was curtailed." Wheat was "lower on liquidation, induced by good crop reports, and despite confirmation of the heavy deficit in the German crop, the poor French crop, and of the short yield in Hungary, with doubtful prospects in other countries of Europe." On the New York Stock Exchange there was very little activity. The Fourth of July holiday (Thursday) was extended through the week; the

"record-breaking temperature made one extra day desirable." The uncertainty about the corn crop, due to the injurious effects of the drought, justified "some hesitation on the part of investors in railroad securities."

One of the most important developments of the second week of July was "the rampant speculation in corn and oats, due to reports of exceedingly heavy damage in the Missouri Valley belt." Stocks were so excited, owing to the crop damage reports from the corn-belt, "that they disregarded the indication of a record wheat crop." "Bearish interests" were "prompt to proclaim that the total failure of corn was in prospect, with an attendant diminution of railroad traffic at the West." On the strength of such reports "the market broke badly." The heaviest declines came in the stocks of railroads which were likely to be affected by a partial failure of the corn crop in the Southwest. Atchison and Rock Island were good examples. The preferred stock of Atchison fell to 92¾, while the common stock sold down from 86¼ to 70. Rock Island declined from 151 to 132½. Reports that rain was likely to fall in Kansas caused a rally from the low figures. The market in cotton was "irregular and professional," weather conditions in Texas playing an important part in bringing about changes in prices.

The effect of the weather conditions—real or speculative—of the week ending July 20 upon the prices of the staple products was very interesting. "It has been a weather market for the cereals," says one trade journal. The week began with a severe break in corn, "but quotations hardened again as the week advanced on reports that the rains falling have only afforded partial relief. The close of the week again finds both cereals (wheat and corn) at top prices, that for corn being the highest for years." The situation was, however, "relieved by moderate rains at many points, and also lower temperature." The cotton-crop outlook was reported as greatly improved by rain. "More encouraging weather reports, and less interest by exporters, were the chief depressing influences" on the price of cotton. In spite of the short corn crop, the large wheat yield made it evident that the cereal production of the West, as a whole, would furnish abundant traffic for the railroads. The appearance of rains in certain parts of the West led to considerable repurchasing of railroad stocks by capitalists who had sold Granger and Pacific stocks on the unfavorable crop outlook of two weeks before. Thus, there was considerable investment buying of Atchison preferred stock on the news of rain in Kansas and the expectation that at least a moderate corn crop would be secured in that

State. The common stock rose from 68½ to 78½. Rock Island was a very strong feature, "and the Grangers generally responded promptly to the improvement in the corn-crop outlook."

The high prices of corn in this country during the week ending July 27 had their natural effect upon the amount of that cereal exported by other countries, which reaped the "benefit of high prices made in this market." Argentina sent "a million bushels more than the United States, and Danubian ports nearly as much." Stocks moved vigorously all the week, "declining on Chicago's advices of heat in the corn-belt, and rallying when the drought was reported broken." The highest non-corner prices paid for corn since 1894 were paid during the week at Chicago and New York. Stories of damage by heat and drought to other cereals made the three great staple crops—corn, wheat and, oats—move up sharply together. Reports of scattered rains caused a reaction from the high prices. Little attention was paid in the New York stock market to any news except that relating to corn-crop conditions, because of the general impression that the serious reduction in the yield would materially affect many railroads. The direct loss to the railroads in the diminished tonnage of corn itself is naturally an important item; but there is also a falling-off in the general business of the districts affected by the drought, and a corresponding diminution of the general tonnage of the roads. For some months confidence had been expressed in the increase of the Union Pacific's dividend rate on its common stock from 4 per cent., it being generally expected that the rate would be raised to at least 5 per cent. The drought and damage to crops in the territory tributary to the Union Pacific in Kansas and Nebraska "created an unfavorable feeling," and "raised strong doubts as to the possibility of any increase in the 4 per cent. dividend on the common stock." The corn-crop situation made the Granger and Pacific stocks the feature of the railroad share list. Union Pacific was one of the most prominent stocks in volume of transactions, and sold down very sharply from 104½ to 93¼. St. Paul fell from 164 to 152½, and the other Grangers were proportionately affected. Unfavorable crop news led to some selling of Union Pacific "convertible fours." The cotton market exhibited considerable weakness, one factor in causing which was the precipitation in the States where moisture had been badly needed.

After about one month of intense heat and of drought the end of July and the first few days of August at last brought lower temperatures and good rains over most of the drought-stricken districts.

The relief to trade was immediate and general. The rains throughout the western half of the country had "the expected effect of inducing a more cheerful tone," and the feeling was decidedly more hopeful than a week or more before. In the great corn States a much larger proportion than usual of the year's crop had been planted late, and this late corn experienced a general improvement, although the early corn was practically ruined. A large spring-wheat crop was practically assured by the rains. Cotton-crop conditions at the South also improved, and trade reports were consequently more cheerful from Southern cities.

An abundance of forage supplies for cattle was now certain. The Western farmers, therefore, regained courage, and the rush of cattle and hogs to market stopped. Cattle receipts at Kansas City fell off 25,631 from the preceding week. The pressure in this line being removed, many of the cattle which had been sent to market were not slaughtered, but were kept to be fattened for the dressed-meat market. Hence a great accumulation of skins was no longer expected.

The most unfavorable trade reports naturally came from the Central West and Southwest, where the loss from drought had been greatest. Kansas City reports that anxiety had been followed by "a feeling of relief and hopefulness;" cancellations had stopped, and country merchants had taken new courage. The bank clearings for July at Kansas City were the largest on record, on account of the heavy receipts of cattle and hogs. For the country as a whole, July bank clearings were limited, as might be expected, by the "intense heat and drought."

In the New York stock market the break in the drought was followed by a general improvement in quotations for railroad shares. Support was given Southern Pacific on the theory that a dividend on that stock was more likely because of the possible diminution of the Union Pacific's earnings, resulting from a reduction of the corn crop. The news of rain in the West caused decided sharp advances in the leading Granger and Pacific shares. Union Pacific advanced from 98⅞ to 101½, and nearly all of the securities which had been affected by speculative bear-selling, on the reports of damage to crops, also rose. St. Paul advanced from 160½ to 163⅜, and Missouri Pacific rose from 98 to 102¼. Southern Railway preferred and common stock developed "a certain amount of heaviness," because of the feeling that a smaller cotton crop would unfavorably affect the earnings of that road.

Fluctuations in corn continued, as conflicting reports of greater

or less loss were given currency. Good spring-wheat crop reports and liberal arrivals at interior cities weakened prices of that staple. Cotton was weaker, owing to the arrival of needed rains. Meats were firmer as western shippers became less frightened, and reduced the movement of cattle. Dairy products still continued high.

Under the influence of the extreme heat of the month, summer travel on railroads and steamships is reported as having been the heaviest in years, while the hotels in sections frequented by summer visitors did an excellent business. In the dry goods trade the July business did not come up to expectations, the market having "had to contend with unusually trying weather over the greater part of the country." There was, however, a feeling in dry goods jobbing circles that the crop scares, due to drought, would make the fall season later than usual.

Business was affected during July along many other lines than those already referred to. The number of failures in August was larger than usual, the disturbing influence of the July drought making itself felt during the following month. Building was interfered with, and trade in paints, oils, and other building requisites was checked. Meats were in less demand, and wholesalers in some cases reduced prices in order to move fresh meats in storage. The consumption of milk increased greatly; hence there was a scarcity in many cities, which was partly also owing to the fact that farmers kept their milk for cream instead of running the risk of its souring *en route* to the cities. The demand for ice was so great that there was difficulty in chartering enough vessels in which to ship the ice from Maine. The hot weather was unfavorable for the curing of fish; benefited turpentine farms; increased the sale of fruits and vegetables. And so on.

The examples above given show that excessive heat in some cases curtailed trade, because it kept people at home. In other cases it stimulated trade, because it prompted purchases of summer clothing and vacation supplies. These effects may be classed as direct. Again, in sections where high temperatures were needed for crops, the excessive heat promoted the growth of these crops, and thus induced a healthy feeling and improved business conditions. Or, in other sections where rain was needed, crops or farm produce suffered from drought; the outlook for farmers was poor, and hence trade suffered. Such effects as these latter may be classed as direct.

When the various places from which trade reports were received are divided into two classes, and the prevailing weather conditions are closely studied, it appears that in the majority of cases the key

to the state of trade is found in the weather. Trade is so carefully adjusted to the average weather conditions of any particular month that seasonable weather, other things being equal, usually means seasonable trade. When meteorological conditions are unseasonable, trade is quick to reflect the change. Trade, however, is subject to many and widely-varying controls; hence the problem of the particular controls which affect it in any one week is a very complex one, and the key is by no means always, or sometimes even at all, to be found in local weather conditions. The trade of a city, it must be remembered, is largely dependent upon orders coming from other sections of the country, often at a considerable distance. Hence, although the weather in the city may be unfavorable, and local trade somewhat depressed, orders from the tributary district may suffice to overcome this depression and keep trade up to the usual standard. Again, while a spell of seasonable weather promotes active trade among the inhabitants of a city, the farmers round about take advantage of this opportunity to work in their fields, and trade in the country districts suffers because the farmers are too busy to make purchases. Furthermore, the relation between temperature and precipitation and crops, and hence, indirectly, the control of these elements over trade, cannot be expressed in any simple way. If there has been sufficient rainfall, high, or even unusually high, temperatures may be just what are needed to promote the growth of crops; while, on the other hand, if the rainfall has been deficient, high temperatures may be very injurious. The proper distribution, in time and in amount, of temperature and rainfall in their relation to crops is a subject which still needs careful study.

The effects of the varying weather conditions of July upon the prices of cereals and stocks have been briefly noted. In considering these fluctuations in price it will, of course, be remembered that many reports of damage by, or of beneficial effects of, different meteorological conditions upon crops, and hence upon railroad earnings, are circulated by speculators in their own interest. It is, therefore, often almost impossible to distinguish the real from the speculative damage or benefit. A close study of the conditions of the stock market during July, however, shows pretty clearly that the speculative reports were really based upon facts of some damage, or of some benefit, to crops due to the weather. The real difficulty was that these reports were often greatly exaggerated. With all the speculation which was rampant during the month, many of the fluctuations in prices seem to have had a fairly reasonable foundation in the changing conditions of the weather.

THE POPULATION OF THE UNITED STATES BY SEX, NATIVITY AND RACE.

BY

HENRY GANNETT.

The Census Office has recently published a bulletin giving the classification of the population by the above elements, and the results are of great interest, as showing modifications of the population during the past decade, much of which has been a period of great business depression. Such depressions commonly produce marked effects upon peoples subjected to them.

During the decade from 1890 to 1900, while the total population has increased from 63,069,756 to 76,303,387, or at the rate of 21 per cent., negroes have increased from 7,488,788 to 8,840,789, or at the rate of but 18.1 per cent. The corresponding rate of increase for the white population is 21.4 per cent., and for the native whites 23.3 per cent. The proportion of negroes has diminished during the ten years from 11.9 per cent. to 11.6 per cent. As heretofore, the race is not holding its own proportionally with the whites, although its relative diminution is not as great as in the preceding decade.

The proportion of negroes has increased in many northern States, where they form only a small element of the population; but in all of the southern States, in which they form an element of magnitude, their proportion has diminished, with the exception of Florida, Alabama, Mississippi and Arkansas. The movement of the race appears to have been both southward and northward, involving a notable reduction in the proportion of negroes in the border and south Atlantic States.

The number of the foreign-born has increased from 9,308,091 to 10,460,085—an increase of 12.4 per cent. only, and a reduction in the proportion which their number bears to the total population from 14.8 per cent. in 1890 to 13.7 per cent. in 1900. This result was to have been expected, inasmuch as immigration has been largely reduced during the decade; and while we have no measure of the number of returning immigrants, it must have been large.

Of all the States and Territories eight only show an increase in the proportion of the foreign-born during the decade. These are Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut,

New Jersey, Indian Territory, and Oklahoma. With the exception of the last two all these are northeastern States, lying upon the seaboard. In all the other States of the Union the proportion of foreign-born has diminished.

But the effect of reduction in immigration and the return of immigrants, due to the business depression, was still more marked than this. In no fewer than fifteen States, viz.: Maryland, South Carolina, Alabama, Tennessee, Kentucky, Ohio, Indiana, Michigan, Wisconsin, Iowa, Missouri, South Dakota, Nebraska, Kansas, and Nevada, the proportion of the foreign-born has actually diminished. As will be noted, many of these are States in which the foreign-born element is in great strength. With the exception of Maryland and South Carolina they lie in the interior of the country, most of them being in the upper portion of the Mississippi valley.

The population is distributed as regards sex on almost exactly the same lines as ten years before, the proportion of males being 51.2 per cent. and that of females 48.8 per cent. The distribution of the sexes by States shows only two trifling changes from that in 1890, Connecticut having an excess of males instead of an excess of females, while in Georgia the case is reversed. Nearly all the States of the Atlantic seaboard, as heretofore, contain an excess of females; while west of them the States, in unbroken series, contain an excess of males, such excess being greatest in the Rocky Mountain region.

Among the native-born whites males are slightly in excess, there being 51 per cent. of that sex to 49 per cent. of females. Among the foreign-born the proportion of males is 54 per cent., that of females 46 per cent. The proportion of males in this class shows a slight reduction from that of ten years ago, when it was 55 per cent. The negroes are divided almost equally between males and females, females being in excess to the extent of a fraction of 1 per cent. only.

The Chinese have diminished in number from 126,778 in 1890 to 119,050 in 1900. They have scattered widely over the country, instead of living, as in 1890, almost entirely on the Pacific coast. In 1890 there were in California 72,472; while in 1900 the number in this State had diminished to 38,841.

The number of Japanese has increased from 2,039 to 56,786, 33,905 of which number were in Hawaii.

NOTES ON CLIMATOLOGY.

BY

ROBERT DE C. WARD.

ANTARCTIC METEOROLOGY.—The Great Unknown of Antarctic Meteorology is disappearing. Slowly at first, and then more rapidly, did the meteorological data brought back by South Polar expeditions make it possible to carry the mean annual and mean monthly isobars and isotherms of the earth's surface with greater and greater accuracy to higher southern latitudes. With the elaborate meteorological equipment, which comprises balloons and kites, of the present British and German Antarctic expeditions, and with the co-operation which is planned between these expeditions, it is certain that within the next few years we shall gain in our knowledge of the meteorological conditions in the Antarctic more than has been gained in all the preceding years of Antarctic exploration. This is, therefore, a fitting time to gather up what is now known about the interesting weather conditions of the Far South. In a recent article in *Petermanns Mitteilungen* (1901, 128 *et seq.*), which has been translated in the *Scottish Geographical Magazine* for September (pp. 473–480), Supan considers *Antarctic Climate* in an admirably concise summary, which will be found useful by any one who seeks information on this subject. Supan points out particularly the importance of the results of the *Valdivia* and *Belgica* expeditions. In the *Journal of School Geography* for last May, George D. Hubbard considers *The Meteorological Conditions of the South Polar Regions* in a less inclusive manner. This article, however, sets forth the main facts of note, and points out the importance of the pressure and wind observations in relation to the theory of the general circulation of the atmosphere. In this connection it is well also to call attention to the publication of an *Antarctic Manual*, prepared for the use of the members of the British Antarctic Expedition under the editorship of Sir George Murray, F.R.S. Articles in this volume concern, among other subjects, ice nomenclature, astronomical data, terrestrial magnetism, climate, wave observations, atmospheric electricity, the aurora, geology, volcanic action, ice observations, zoology, botany, sledge travelling, geography and an Antarctic bibliography. The *Manual* contains, in a very condensed form, practically all that is known about the South Polar regions.

THE MOON AND THE WEATHER.—The relation between the moon and various weather phenomena is a subject in the investigation of which a good many persons have spent a good deal of time without the attainment of noteworthy results. During the past year there has been some revival of interest in this matter because of the appearance of a new journal devoted to the publication of articles on this subject. This journal, *Climat*, is under the editorship of M. Nicolai Demtschinsky, of Torbino, Russia. It is printed bi-monthly, at St. Petersburg, in four languages, viz., English, German, French, and Russian. The practical prediction of the weather for a long time in advance, by means of certain conclusions based on supposed lunar influences, is the topic to which the earlier numbers of this journal were devoted. In Nos. 1 and 2, M. Demtschinsky published a series of curves showing the probable course of the barometer and thermometer at a number of European stations during April. Dr. H. R. Mill, in *Symons's Monthly Meteorological Magazine* for May, made a careful comparison of the predicted and of the actual weather conditions at Aberdeen and Valencia. This, so far as we have seen, is the only published comparison of prediction with fact of observed weather. Dr. Mill found, as was to be expected, that "practically the forecasts as a whole would appear to be valueless," so far at least as those two stations are concerned. It is unlikely that *Climat* will live long, or that it will receive much attention from men of science.

HOT WAVES.—A report on hot waves in the *Yearbook of the Department of Agriculture* for 1900 is of special interest at the present time, in view of the excessive heat of last July. A study of three notable hot spells is illustrated by maps showing the distribution of pressure and temperature over the continent during these spells. The conditions are fairly similar in each case, viz., an area of moderately high pressure in the sub-tropical region to the southeast; an area of moderately low pressure in the north central States, and a second area of high pressure on the west or northwest coast. A slow flow of air results from the southeastern anticyclone to the central cyclone, and the extreme temperatures occur between these two regions. The intense heat is due largely to the clear sky, which allows a very free passage of insolation. The radiation at night seems to be slight; and this is stated to be due to the presence of much transparent water vapour in the higher strata of the atmosphere, which checks the outward passage of the coarse-waved terrestrial radiations.

A NEW TEXT-BOOK OF METEOROLOGY.—The latest text-book of meteorology, which was published early in the summer, is by Dr. Börnstein, professor in the Royal Agricultural High School at Berlin (*Leitfaden der Wetterkunde*). Within the limits of 156 octavo pages, the author has given an excellent presentation of his subject, in such a way that beginners may read his book with profit. The most important recent developments of the science, so far as they lie within the limits set for himself by the author, are included. Thus, for example, the noteworthy conclusions reached by Pettersson and Meinardus concerning seasonal forecasts for Europe based on certain characteristics of the Gulf Stream, and the meteorological results obtained during recent balloon ascents, are considered. The chapter on weather is particularly complete. The weather types of Köppen and van Bebber are explained, and numerous weather maps are given as illustrations. The book shares with most German text-books the great disadvantage of having no section headings. There is a good working bibliography, mostly confined to German publications, and nine colored plates, reproduced from the International Cloud Atlas, illustrate the cloud types.

LORIN BLODGET.—Lorin Blodget died in Philadelphia on March 24 of the present year, at the age of 78. Blodget's name is not commonly known to the younger generation of scientific men in this country, but his writings on meteorology entitle him to a place among those who have contributed to the development of this science in the United States. Blodget's interest in meteorology began when he was about twenty years old. He became a voluntary observer of the Smithsonian Institution, and was later employed by Professor Joseph Henry in reducing meteorological records. In 1857 Blodget published his great work on the *Climatology of the United States*—a book which has for many years been out of date in its statistical portions, but which nevertheless contains a good deal of general information about the larger climatic features of the country that is still useful. This *Climatology* is a book of 536 pages, and contains a large number of tables and charts. Some idea of the wide field which the author intended his work to cover may be gained from the title, which is as follows:

"Climatology of the United States, and of the Temperate Latitudes of the North American Continent. Embracing a Full Comparison of these with the Climatology of the Temperate Latitudes of Europe and Asia, and especially in regard to Agriculture, Sanitary Investigations and Engineering. With Isothermal and Rain Charts for each Season, the extreme Months, and the Year. Including a Summary of the Statistics of Meteorological Observations in the United States, condensed from recent Scientific and Official Publications."

MAP NOTICES.

BY

HENRY GANNETT.

Since our last notice, the United States Geological Survey has published thirty-one atlas sheets. Of these, one only, Old Forge, is in the State of New York. This, on a scale of 1:62,500 in 20-foot contours, is in the Adirondacks, and represents a lacustrine region, with irregular mountains, hills, swamps, and crooked winding streams showing glacial topography, with a general northeast and southwest trend.

The Camden sheet, on a scale of 1:125,000 and a contour interval of 20 feet, is comprised mainly in New Jersey, but includes a portion of southeastern Pennsylvania; the city of Philadelphia being in the northern portion of the sheet.

The Chestertown sheet, on a scale of 1:62,500, with a contour interval of 20 feet, lies in the northeastern part of Maryland, being on the east shore of Chesapeake Bay. It shows a low country, rising scarcely 60 feet above tide, with many drowned valleys.

The Columbia sheet, on a scale of 1:125,000 and a contour interval of 50 feet, lies in the western part of Tennessee, and represents a hill country maturely dissected, with winding streams slightly incised.

In Iowa are two sheets on a scale of 1:125,000, with a contour interval of 20 feet. These, Peosta and Stanwood, in the eastern part of the State, represent a rolling country somewhat dissected, especially in the neighbourhood of the Mississippi River.

In Indian Territory there are twelve sheets, all on a scale of 1:125,000, with a contour interval of 20 feet. Five of these, namely, Claremore, Muscogee, Nowata, Pryor, and Tahlequah, lie chiefly in the Cherokee Nation, and represent in the main a country of low relief, although in the eastern parts of Muscogee and Pryor the country rises into the dissected plateau known as the Boston Mountains, which are, in fact, the western portion of the Ozark plateau. Stonewall, Tuskahoma, Alikchi, and Antlers lie mainly in the Choctaw Nation. On these sheets is represented a portion of the crooked ridges of the Ozark hills in the Territory. The Denison sheet lies in part in the Chickasaw Nation and in part in northern Texas, and represents a country of low relief with the broad

bottom land of Red River, over which that vagrant stream wanders at will. Two sheets—namely, Addington and Tishomingo—lie entirely within the Chickasaw Nation, and represent a country with little relief.

In Wyoming are three sheets, all on a scale of 1:125,000. Newcastle sheet includes the portion of the Black Hills in the eastern part of the State. The Dayton sheet represents a part of the Big Horn Mountains near the northern boundary and the plains at their base. The "Rimrock," as the high hogbacks on this range are called, is admirably illustrated on this sheet. The Grand Teton sheet includes most of the Teton Range and Jackson Hole.

In Montana is one sheet, Hamilton, on a scale of 1:125,000, with a contour interval of 100 feet. This sheet represents the eastern front of the Bitter Root Mountains, with the divide of the range and the valley of Bitter Root River at its eastern base. Glacial amphitheatres, lakes, hanging valleys, and gorges are admirably illustrated on this sheet. The straight courses of the present streams in their glacial gorges are due to their extremely high grade. The divide has been cut back from the front of the range to its present position, leaving the highest summits, as a rule, upon the spurs.

Sand Point lies in northern Idaho, and represents a mountainous country with portions of two great glacial lakes, Priest and Pend Oreille, with a portion of Clark Fork flowing out of the latter lake.

In Washington are six sheets, all on a scale of 1:125,000, with a contour interval of 100 feet. Spokane lies in the eastern part of the State, showing in the eastern part foothills of Rocky Mountains, and in the western part a level lava plain in the eastern portion of the Great Columbia Plateau. The other sheets—Methow, Ellensburg, Chelan, Stilaguamish, and Glacier Peak—are all in the Cascade Range, the first three being upon its eastern and last two upon its western slope. Methow and Chelan include portions of Lake Chelan, that great gorge of an extinct glacier. Ellensburg lies farther south, and includes the lower slopes of the range. Glacier Peak includes a high mountain region about the snmmit of the range and shows many small glaciers. Glacier Peak, with an elevation of 10,436 feet, is entirely surrounded by ice. The entire region represented on this sheet is extremely steep and rugged. Stilaguamish lies west of the latter, and includes a portion of the western slope of the range, comprising the valley of Sauk and Stilaguamish rivers, with heavy, broad mountain spurs separating them.

In California are two sheets, both on a scale of 1:125,000, with

a contour interval of 100 feet. Mount Lyell sheet represents a portion of the summit of the Sierra Nevada, extending on the east to Mono Lake and on the west nearly to Yosemite Valley. This region throughout has been carved by glaciers, and presents examples of nearly all phenomena of glacial erosion, including U-shaped gorges, hanging valleys and amphitheatres, with their accompanying lakes and bare granite slopes not yet covered with soil (for the occupation of this region by ice has been very recent), while upon the high mountains small glaciers still remain. Altogether this is one of the best sheets for illustration of glacial phenomena which has been produced. The San Luis Rey sheet lies in southern California, upon the Pacific coast, and represents a country of irregular hills and intermittent streams—for it is an arid region. The mouths of the streams flowing to the Pacific have been closed by the deposit of sand from the currents along the coast, so that their only outlets are by percolation through the sand-bars.

The *Annales de Géographie*, Tome X, 1900, contains an article by Monsieur L. Gallois on the Andes of Patagonia, accompanied by a map in three sheets showing the breadth of South America south of south latitude 39°. This map bears the following title: Carte de la Partie Méridionale de la République Argentine, d'après les documents de la Commission Argentine des Limites avec le Chili et du Musée de la Plata par F. P. Moreno, Expert Argentin et Directeur du Musée. The scale is 1:1,500,000. Water bodies are printed in blue, culture and lettering in black, and relief is expressed by brown crayon work.

This map represents the Andes chain within the South Temperate Zone, with the Atlantic and Pacific slopes.

The mountains have been extensively glaciated, as shown by the existence of many lakes and the irregularities of the streams. Indeed, in numerous localities glaciers of magnitude still exist. One interesting feature in connection with this country is the fact that the westward-flowing streams have eaten their way across the divide to the eastward, in many cases to considerable distances, and this fact has given rise to contention between Chile and Argentina concerning the proper location of the international boundary, one party contending that it should follow the water divide, the other that it should follow the crest of the highest land.

As this map represents recent and extensive explorations and surveys it is probable that it will induce much correction in the general maps of this region.

GEOGRAPHICAL RECORD.

AMERICA.

PEARLS IN AMERICAN WATERS.—The Consular Reports (June, 1901) said that the Government of Colombia had decided to sell the exclusive right, for fifteen years, to work the pearl fisheries in the Gulf of Panama. The small group of islands, consisting of Del Rey, San José, Pedro Gonzales, and many islets, about fifty miles southeast of Panama, have been famed for more than a century for their yield of pearls and coral. Many pearls of great value have been found by divers working at seasons of the year when the water is unusually clear. It is not common, of late years, to make very valuable finds, though pearls of great worth sometimes reward the fishermen. About two years ago a boy, while diving in shallow water, found a pearl, which he sold to a local dealer for a sum equal to $1,760. It is now for sale in Paris, an offer of $6,000 for it having been refused. The yield of pearl-shell (mother-of-pearl) is of considerable importance.

The fishing-grounds of Margarita, off the north coast of Venezuela, contributed for centuries to the world's supply of pearls. The industry has been almost abandoned in recent years, as the banks seem to be about exhausted. Our Consul at Caracas writes that the past few months have witnessed a wonderful revival of the industry. About 2,000 natives and 400 sailing vessels are engaged on the northeast and northwest shores of the island. In July last the value of the output this year was estimated at about $600,000. The pearls are of fine quality and beautiful lustre. In May last a large white pearl was sold for $1,700. Most of the pearls are sent to Paris, as that market, on the whole, offers the best price for them.

ATTRACTING GOLD DUST.—Mr. L. Gentil Tippenhauer, whose reports on his geological investigations in Haiti have been printed in *Petermanns Mitteilungen*, tells this remarkable story (No. VIII, 1901):

> In conclusion, I will mention a most unusual phenomenon. As I was engaged in making microscopic studies of the gold-bearing river sands, I observed that the thirteen-year-old daughter of my companion, L. Aboilard, had only to thrust her hand into the sand and gold dust would cling to it. Every time she did this the gold remained on her hand. When she shook her hand the sand fell to the ground, but the flakes of gold remained. No other person possessed this peculiarity. The

phenomenon has since been attested by the educated Europeans in Jacmel; also by Dr. Zervas, geologist and representative of the Standard Oil Company and other gentlemen. The numberless particles of iron in the sand did not remain in the girl's hand. I must, therefore, draw the conclusion that there is in nature a power which has an influence upon gold similar to that which magnetism exerts upon iron and related minerals. The daughter of Mr. Aboilard seems to have this power.

MANUFACTURES IN RHODE ISLAND.—The census statistics of Rhode Island's manufacturing industries are of special interest, because they are the first data yet printed relating to the industrial progress of any of our great manufacturing States in the past decade. In the census year 1900, 22.5 per cent. of the entire population and in the busiest season of the year, 27.5 per cent., or 117,986 persons, were engaged in manufacturing. The growth of manufacturing industries has made steady progress for fifty years, in which time the average number of wage-earners employed has increased 364.4 per cent., while the growth of population has been only 190.5 per cent. The capital invested increased about $57,000,000 in the past decade, being $183,784,587 in 1900. The number of establishments grew from 3,377 in 1890 to 4,189 in 1900. The textile industries are by far the most important. They give employment to 51 per cent. of the wage-earners, and the value of the product is 42.4 per cent. of the total value of all the products of the State. Jewelry is the second most important industry, the product being valued in 1900 at $13,320,620, which is 66.3 per cent. more than in 1890, when one-fifth of the jewelry of the country was manufactured in Providence. Machinery is the third most important industry. The three cities pre-eminent in manufacturing are Providence, Pawtucket, and Woonsocket, whose output in 1900 amounted to $127,876,764, or 69.5 per cent. of the total product of the State.

EUROPE.

COAL IN THE NETHERLANDS.—The Dutch have long bought from foreign countries, mostly England and Germany, about all the coal they consume. The fact that they have produced little coal at home has been prejudicial to the large development of their industrial interests. The southern part of Limburg, in the extreme southeastern part of the country, is the only region where coal-mining has been carried on. It is reported in *Petermanns Mitteilungen* (VIII, 1901) that there is now every likelihood of a large development of coal-mining in that region in the near future. The investigations of the past decade have revealed large deposits. The product at present is only 1,200 tons a day, but there seems

to be no reason why the yield should not be increased to 10,000 tons a day. Whether these mining interests remain in the hands of the State or are turned over to private companies the prospects are that in time the Netherlands will produce nearly, if not all, the coal which the country requires.

Russian Anthropology.—The *Scottish Geographical Magazine* (Sept., 1901) says that M. Zaborowski has made a study of the skulls collected in differents parts of Russia and Siberia by M. le Baron de Baye, and has been able in consequence to clear up several obscure points in the history of the human race. He has pronounced against the old theory that the earth was peopled from the north, and that the cradle of the race was in Siberia; he has demonstrated that the central regions of Asia were already inhabited when Siberia was still one enormous glacier. He has also proved that the Finns from the north colonized Russia, though so lately and so slowly that the Caucasus is still almost entirely populated by Turks or Mongolians. He points out that one skull, which is curiously covered with red powder, has the same characteristics as other very old ones found in caves near Mentone, France, which leads to the conclusion that at some far distant time one race inhabited the whole of central Europe.

Studying European Fisheries.—The representatives of eight Governments attended a conference at Christiania in May last, when plans were adopted for the scientific study of the fisheries along the coasts of northwest Europe. The proceedings were conducted on the understanding that the investigations are to be carried out strictly with a view to practical results as regards fisheries. The field embraces all the great cod, herring, and mackerel grounds of northwest Europe and the inshore fisheries, including the oyster beds. The biology of food fishes will be studied; the Conference urged the importance of ascertaining the distribution of fish and fish food with sufficient detail to permit the drawing of charts. While special areas of research have been assigned to each nation, none is to be excluded from extending its studies beyond the allotted territory. Several of the countries are building special vessels to carry on their share of the researches. The allotment of the spheres of work is as follows:

From 58 degrees to 62 degrees north the investigation of the North Sea and North Atlantic will be shared by Great Britain, Norway and Denmark, while the North Atlantic further north and the Arctic Sea will be investigated by Norway and Russia. The Skagerrak and Kattegat are assigned to Norway, Sweden, and Den-

mark; the western Baltic to Germany, Sweden, and Denmark; the southern part of the eastern Baltic to Germany; and the northern part, including the Gulfs of Finland and Bothnia, to Sweden, Russia, and Finland. Great Britain will attend to that part of the North Sea lying south of 58 degrees north and west of 2 degrees east; while Belgium, Holland, Germany, and Denmark will be responsible for the sea lying off their own shores.

RETIREMENT OF PROFESSOR SUESS.—The seventieth birthday of Professor Eduard Suess, the distinguished geologist of Austria-Hungary, was celebrated on August 20. At the end of the last semester of the University year he retired from the chair of geology in the University of Vienna, after a service of thirty-five years. In the course of a half century he has contributed voluminously to the literature of his scientific specialty, but nearly all his studies and writings were preparatory to the production of his great book, *Das Antlitz der Erde* (The Face of the Earth), which he was over eight years in writing. Professor Suess, of course, did not originate the theory—which he holds with many other geologists—that the elevations and depressions of the rock surfaces are due primarily to the cooling and consequent shrinkage of the earth's crust, which results in the breaking of the strata and the uplifting or folding of the rock masses. The distinctive merit of his work is that never before was so vast an array of evidence adduced tending to substantiate the correctness of the theory; and never before were proofs of its accuracy carried so far. As Dr. Wichmann, of Gotha, has said of him: Suess was a road-breaker, and the future investigation of the problems he treated must always take into account the way he made for himself and for the specialist who will come after him.

ASIA.

EXPLORATION OF THE ARAL' SEA.—The *Verhandlungen* of the Berlin Geographical Society says that the Turkestan section of the Imperial Russian Geographical Society having commissioned Mr. L. B. Berg to explore the Aral Sea, he organized a party, and with difficulty transported a sail-boat, ten metres long, to Kasalinsk, on the Syr Daria river, whence the expedition started on June 16, 1900, for the delta of the river on the north-east coast of the sea. Topographer Moltschanow remained here on the low island Kossaral for two months, making an excellent map of the whole delta with the neighbouring parts of the coast. On June 25 the expedition put out into the sea, and visited the large and still little-known islands Barssa-Kelmess and Nikolai, in the central part of it, land-

ing on June 28 on the steep west coast which forms the eastern edge of the desolate Ust-Urt plateau. Geological collections were made in the Ust-Urt, and the coast was then skirted to the north as far as the Kai-kubek Mountains, which jut out into the sea on the northwest side. Thence the expedition sailed straight across the sea to the Menschikow island, between the mouths of the Syr Daria and the Amu Daria, in order to ascertain the depths in the middle of the sea. In August Mr. Berg investigated the sea life, many specimens—both animal and vegetable—being collected. Meteorological observations were carried on daily for three months. The depth in the middle of the sea was from twenty to twenty-three metres, the maximum depth (62.3 metres) being found not far from the steep slope of the west coast. The waters are characterized by low salinity and unusual transparency, objects being clearly visible 20.5 metres below the surface. There were numerous indications of a rapid rise in the level of the sea, which is all the more remarkable because all travellers from 1820 to 1880 reported that the tendency was towards desiccation. High-water marks, which Berg recorded on the rocks, will in future be helpful in ascertaining the variations of sea-level.

Dr. Hedin's Second Expedition in Central Asia.—Dr. Sven Hedin is expected to complete this year his second series of explorations in Central Asia. He will probably not be able to return to Europe until next spring, about three years after his departure. A long account of his work up to April 23d last has been received in Sweden. Earlier letters had brought the news that he had travelled down the Yarkand and Tarim rivers to the Lob Nor region, where he discovered an ancient lake-bed, which strongly confirmed his theory that the ancient Lob Nor was not identical with the lake that now bears that name.

The work he accomplished later, up to April 23d last, was (1) to survey the mountains south of Lob Nor, in northeast Tibet, as far as the westerly Kum-Kul ranges. Most of his work there was in unknown country, but he spent only a month in this field; (2) from a point east of Lob Nor he crossed the Gobi desert straight to the north, passing through the mountainous region which is the western extension of the Kurruk Tagh, and found the existing maps quite incorrect. Water was very scarce and the camels would have succumbed if snow had not been found; (3) the ruins on the north shore of the ancient lake-bed of Lob Nor were then visited and carefully studied. The discoveries

made here were numerous and important. Among them were twelve letters in Chinese in an excellent state of preservation, a Buddhist temple in which artistic wood carvings were found, and other remains of a civilization that probably dated back at least 800 years.

Dr. Hedin wrote that he had gathered material sufficient for a large volume on the Lob Nor problem alone. He had already compiled 726 sheets of maps. He hopes to be able to publish a large atlas of sixty to seventy maps on a scale which will permit him to show all details. He proposes to publish the scientific results of all his geographical, geological, and hydrographical studies in two large volumes of 500 pages each, which will form the text to the atlas. It is his desire, also, to print a popular account of his work in two volumes of moderate size.

He found that the water from the present Lob Nor is beginning to flow back into the ancient bed.

When he wrote he expected to start in eight or ten days from Charkhlik, a little south of Lob Nor, on the last stage of his great journey. He intended to cross Tibet diagonally, following a generally southwest direction, to the sources of the Indus river. As he travels slowly and maps carefully he expected that this march would occupy the rest of this year. If possible he will visit Lord Curzon in Calcutta and then return to his caravan in order to conduct his men back to Kashgar, whence he will come home with his large collections.

AFRICA.

MAJOR GIBBONS'S EXPLORATIONS ON THE UPPER ZAMBESI.—Major Gibbons, holding the correct view that the time for long journeys of exploration in Africa is past and that he could render most service to geography by choosing a comparatively small territory and carefully exploring it, selected the territory of the Upper Zambesi for his expedition of 1898–1900, and not only surveyed the entire course of the upper main stream, but also its eastern and western tributaries and much of the land between them. He returned home with detailed material for mapping the region to which he confined his attention. (*Geographical Journal, Feb.*, 1901.)

THE JEPPE MAP OF THE TRANSVAAL AND THE SURROUNDING TERRITORIES.—*Petermanns Mitteilungen* (1901, No. VIII., p. 124) says that the map house of Wurster, Randegger & Co., of Winterthur, Switzerland, lithographed and printed for the Boer Government of the South African Republic the official map of that coun-

try, drawn by Frederick and C. F. W. Jeppe in the office of the Surveyor General at Pretoria. The map, in six sheets on a scale of about eight inches to the mile, is the best and most detailed map yet made of that part of Africa. The printing having been completed a short time before the war began, the edition was kept at Winterthur by order of the Transvaal Government, with strict injunctions not to permit it to get into circulation. It is asserted, however, that a copy of the map found its way into the hands of the British, who made it the basis, last year, of the military map issued by the Intelligence Division of the British War Office. The British map was evidently produced from a photographic enlargement of the Jeppe map. It omitted many details of the Jeppe map, such as were not serviceable for military purposes. The original map, which is now being circulated, shows better than anything else the Transvaal as it was before its people were scattered, its farms wasted, and its prosperity destroyed.

Death of an African Pioneer.—The Rev. J. Erhardt, who was well known to all geographers of the last generation, died in Stuttgart on August 14, aged 78 years. The contribution he made to the modern exploration of Africa was as valuable as it was unique. He was the companion of Rebmann and Krapf, the missionaries who founded their station near the port of Mombasa, now a part of British East Africa. Rebmann discovered Kilimanjaro, the highest mountain in Africa, in 1848; and Rrapf revealed Kenia, the second highest mountain, in 1849. While his companions were exploring the unknown interior, Erhardt's talent for linguistic studies led him to devote all the time he could spare from his missionary work to the task of mastering the coast languages, in which he became very proficient. In the course of a few years he collected the testimony of hundreds of Arabs, Swahili and others, with regard to a great lake, far inland, which was so wide that they could not see across it, and extended for hundreds of miles north and south. By collating many reports he obtained a rough idea of the distance of the lake from the sea in different latitudes; but in all the stories he sifted he did not hear of more than one lake, the fact being that some of the information related to Victoria Nyanza, some to Tanganyika, and some to Nyassa. His first report on the great lake appeared in the *Church Intelligencer* in 1855; and in the following year his exhaustive analysis of the evidence he had gathered, proving the existence of a lake, and the tentative map he had prepared of it, were published in *Petermanns Mitteilungen* and

in the *Proceedings* of the Royal Geographical Society. His map showed an enormous sheet of water extending from the region of Victoria Nyanza to that of Nyassa. Though he showed only one enormous sheet of water, later discoveries proved that he indicated the general position of the lake region with approximate accuracy. The information he had laboriously gathered was received with much incredulity; but his map was the final, decisive influence that led to the fitting out of the expedition of Burton and Speke, who discovered Victoria Nyanza and Tanganyika, Livingstone a little later adding Nyassa and Bangweolo to the maps, and thus completing our general knowledge of the great lake region.

NOTES ON COMMERCIAL GEOGRAPHY.

France received, in 1894, 7,500 pounds of tea from Annam, the first tea imported from one of her colonies. The importations in 1899 amounted to about 140,000 pounds. It is believed that Annamese tea will, in time, fill the entire demand of France. The French assert that it is equal to the finest article exported from China. The crop is increasing every year. Up to 1892 Annamese tea was cultivated only for use among the natives. It is now used by all the French soldiers in Annam, and colonists are going into the business of tea-raising, finding it more profitable than any other crop. Natal is also becoming known as a producer of tea. The industry, yielding 400,000 pounds in 1899, is rapidly growing. The planters have high hopes of soon entering the foreign markets with good teas grown much nearer the great consuming countries than the present sources of supply. South Africa is the market as yet for all the tea raised.

MM. Bernard and Lacroix, in their *Historique de la Pénétration Saharienne* (Algiers, 1900), expressed the opinion that the Sahara is of little value. The trade between the Sudan and northern Africa has been much over-estimated, is scarcely 10,000,000 francs a year, and, according to official reports, is decreasing in value. They think that the railroad from Algeria to Lake Chad must be built, as a military and political necessity, but express doubts that it will be of much commercial value. M. Honoré, in his *Le Transsaharien et la Pénétration Française en Afrique* (Paris, 1901), expresses practically the same view. He says that the present trade of the Sahara, including that which passes across the desert between the Sudan and the north coast, amounts to only about 11,000,000 francs a year, and is decreasing, first, because slave imports to the Mediterranean states have largely ceased, and also because the ports on the

Atlantic coast of the Sudan are offering more and more competition for the control of the Sudan trade. Of the European wares, valued at 200,000 francs, imported to Timbuktu in 1899, only 20,000 francs' worth came by the desert route, the balance being imported through Atlantic ports.

The experiments of our Department of Agriculture seem to prove that Egyptian cotton may be grown with success in the dry, hot regions of our Southwest where irrigation is possible. The experimental farm near Phœnix, Arizona, produced fine Egyptian cotton this year from seed brought from the Nile; this variety of cotton will be planted next year in a number of places in Arizona and New Mexico, where the conditions under which the Nile crop is grown are practically reproduced. Three-fifths of the cotton we now import comes from the Nile delta, our imports from Egypt in 1900 amounting to about $5,000,000. The Egyptian fibre is the longest of the cotton staples, except Sea Island. Mixed with American upland cotton it is regarded as indispensable in some branches of our manufactures. It is also used as a substitute for Sea Island, for fine goods where strength and lustre are essential.

Ten years ago the total tonnage of the vessels entering and departing from Hamburg, Rotterdam, and Antwerp was far below that of the shipping tributary to London. In 1899, however, the commercial movement of these three ports reached a total of 21,000,000 tons; while that of London was only 15,200,000 tons. The tonnage movement of the four ports is gaining every year, but that of London is far less than that of the other ports. The gain of 1899 over 1898 was 591,679 tons for Rotterdam, 426,666 for Antwerp, 411,832 for Hamburg, and only 100,776 for London. The main cause of the rapid growth of the commerce of these Continental ports, while that of London is increasing but slowly, is the fact that Rotterdam, Antwerp, and Hamburg have been widely extending their steamship connections with various parts of the world, thus having direct connections with many ports whose commerce with them formerly passed through London, which was a receiving and forwarding station for their trade of much larger importance than it is now.

POLAR REGIONS.

PEARY'S WORK IN 1900–1901.—The New York *Sun*, of September 14, published the following letters:

NORTH SYDNEY, C. B., Sept. 13.—The Arctic steamship *Erik*, from Cape Sabine, Ellesmere Land, reached this port to-day. Everybody on board is well. We left Mr. Peary at Herschel Bay Camp on August 29. He had succeeded in rounding the

northern limit of the Greenland archipelago, the most northerly known land in the world, probably the most northerly land. He expects to spend the winter at Cape Sabine and push north toward the Pole in the spring.

Mr. Peary reached the *Windward* at Payer Harbour, on which we, his family, had been for eight months imprisoned in the ice, at dawn on May 6. He came just as he did to the *Kite*, nine years before, from his inland ice march. For eight months, ignorant of each other's presence, we had been within 250 miles of each other, Mr. Peary at Fort Conger and at his meat caches fifty miles west in the Lake Keazen country and the *Windward* and our party at Payer Harbour, a mile or so south of Cape Sabine, where we were finally stopped at the end of August, 1900.

Mr. Peary brought us first news of his great march of a year before, which took him over the most northerly land of the globe to the highest latitude ever gained by an American, along an unknown coast 160 miles beyond Lockwood's farthest north. Mr. Peary finally and accurately defined the northern coast of Greenland, all the way round to Independence Bay, where he had planted his country's flag nine years before.

Mr. Peary, with Matt and five Esquimaux, left Etah on April 15, 1900, and on May 8, having in the meantime sent back, in parties of two each, four of the natives, opened Lockwood's, furthest north (83° 30′ 25″) cairn of 1882 and substituting matter of his own, pushed forward with Henson and the other Esquimaux, to 83° 39′, where he found that the coast turned sharply to the eastward. Striking out due north from this point for the Pole, he was able to advance but a short distance to 83° 50′ before he met the moving disintegrated pack, a mass of broken ice and open water, which made further progress in that direction impossible.

Returning to the land he resumed his eastern march along the coast, and continued it until at about 83° N., 25° W. he recognized the lofty headland which, in 1892, he had seen from Navy Cliff, at the head of Independence Bay. There he rested for two days, waiting in vain for fog to lift and reveal further features of land and sea, but, unfavorable conditions continuing, he laid his homeward course along the outward track and arrived at Fort Conger on June 15, with men and dogs in good condition.

Mr. Peary sends full and carefully-detailed chart of his newly-discovered country to the Peary Arctic Club, with the suggestion that nomenclature and publication be deferred until completion of his work and return home.

The new coast shows marked change at the farthest north, and the bold headlands and deep fiords are succeeded by a low, rolling foreshore, with traces of glacial action and all the evidences of a continental terminal coast. The likeness of this Greenland coast to that of Grinnell Land west of Cape Hecla is marked and points clearly to similar conditions of land and sea, and suggests that it is the littoral of the true Arctic basin.

Musk oxen, bear, lemming, and hare were killed, and a wolf seen and fired at in the new country, and indications of animal life, isolated probably from southern latitudes, were abundant. In Mr. Peary's farthest north cairn he placed portions of the flag of his country, and his private signal, and the names of the Peary Arctic Club members, under whose auspices the work was prosecuted. Temperature of the journey ranged from −40° to 20° above.

The remainder of 1900 and the first month of 1901 were spent by Mr. Peary, with Fort Conger as a base, in preparation for his advance on the Pole by way of Cape Hecla, the only remaining available route. The start from Conger, with the same force, was made on April 15, exactly a year from the departure of the south Greenland expedition; but ten days in the field demonstrated that men and dogs were not in fit condition, and that it would be hazardous, if not hopeless, to proceed. Mr.

Peary, therefore, decided to return to Fort Conger and begin immediately work on an expedition for the spring of 1902, his first step being a trip southward to learn, if possible, what he might depend on regarding the auxiliary ships of 1900 and 1901.

Four busy months followed. The *Windward* broke out of the ice on July 3, and, after a month's successful work in Inglefield Gulf, among the walrus, of which 125 were killed and landed at Brumt Island, was joined on Aug. 4 by the *Erik*, the auxiliary of 1901. The total walrus score of both ships is 180, or about ninety tons of food for men and dogs, which, with meat and skins of forty deer, are already available for next spring's work.

Mr. Peary has established his headquarters for the winter at Payer Harbour, where the *Windward* was icebound. Heavy ice from Kane Basin prevented the *Erik* from reaching the new base, and after four days of vain and arduous effort, Mr. Peary and his party, including his faithful Esquimos, with their lighter supplies, were disembarked at a temporary camp in Herschel Bay, ten miles south, on Aug. 29, whence he expects in a few weeks to transfer all to his permanent base, not more than ten miles distant.

The *Windward*, with Messrs. Stein and Warmbath as passengers, is following us, but neither ship has news of the *Fram*.

Our winter on the *Windward* was monotonous, but comfortable, our coldest being but 40 degrees below. Once we had a close call by "rafting" ice, threatening to drive the *Windward* on the rocks, but the ship righted herself on the next tide. No serious illness, accident, or mishap of any kind has befallen any of the parties in the field or on ship, and my husband, at our parting at Herschel Bay Camp on Aug. 29, was in the best of health, and full of confidence that he will succeed in the task which he has set for himself for next spring. My purpose now is to rejoin him in the *Windward* at Cape Sabine in August next and return with him to the States.

JOSEPHINE DIEBITSCH-PEARY.

Mr. Peary's letter to H. L. Bridgman, President of the Peary Arctic Club, which Mrs. Peary refers to, is in part as follows:

"CONGER, April 4, 1901.

MY DEAR BRIDGMAN:

It gives me great pleasure to present to the club the results of the work of 1900:

(1) The rounding of the northern limit of the Greenland archipelago, the most northerly known land in the world, probably the most northerly land.

(2) The highest latitude yet attained in the western hemisphere (83 degrees, 50 north).

(3) The determination of the origin of the so-called paleocrystic ice (floe berg), etc.

Considering that I am an old man, have one broken leg, and only three toes, and that my starting-point was Etah, I felt that this was doing tolerably well. It is almost a thousand years since "Erik the Red" first sighted the southern extremity of the archipelago, and from that time Norwegians, Dutch, Danes, Swedes, Englishmen, Scotchmen, and Americans have crept gradually northward up its shores, until, at last, through the instrumentality and liberality of the club, its northern cape has been lifted out of the Arctic mists and obscurity. It seems fitting that this event, characterized by Sir Clements Markham as second in importance only to the attainment of

the Pole itself, should fall in the closing year of the century. If I do not capture the Pole itself in this spring's campaign, I shall try it again next spring.

My gratitude and respects to all the members of the club.

Always most sincerely,

PEARY.

Dr. Dedrich takes this letter south, to be sent by natives to Cape York, thence by whaler to the British Consul at any civilized port."

Mr. Peary also sends to the club a complete and detailed chart of his newly-discovered coast and other work.

Peary's Reconnoissance of the Greenland Inland Ice, in 1886,* was the beginning of the work now happily terminated. From that beginning, with repeated interruptions imposed upon him in the discharge of duty, he has steadily adhered to his plan of exploration from different points of the Baffin's Bay and Smith Sound coasts, to fill out the coast-line, fix its northeastern limit, and complete our knowledge of Greenland. No man has better deserved success, and he might well have turned his back upon the Arctic this year with the consciousness of a great task worthily accomplished, but for his sense of loyalty to the friends who have pledged their support to him for a period not yet expired. He will do what energy and judgment and experience can do to reach the Pole, and it is characteristic of Peary to promise nothing and to perform much.

NOTHING IS KNOWN of the *Fram*. In August, 1899, when the *Fram* came to Etah, her navigator told Mr. Peary that she was going into Jones Sound, if possible. A week or so later the *Fram* was seen out in the ice, just off Etah.

The natives report that she went south between the *Diana* and the *Windward*. They knew her because the *Diana* and the *Windward* were black, while the *Fram* was white.

In all the travelling between Etah and Fort Conger and beyond, during the winter and spring of 1899–1900, and the winter and spring of 1900–1901, nothing was seen or heard of the Norwegians or their ship.

Judging by the ice conditions from Fort Conger down to Cape York, during 1900 and 1901, the *Fram* would not be able to get out of Jones Sound this past summer.

DR. ROBERT STEIN, who returned in September with Mr. Warmbath from their two years' sojourn in Ellesmere Land, published an account of his experiences in the *New York Tribune* of September 29.

* See *Journal* of the Am. Geog. Soc., Vol. 19, pp. 261–289.

He and his two companions had planned an exploration of the western shore of Ellesmere Land. This was found to be impracticable; and in the spring of 1900 Dr. Stein and Dr. Kann started for Upernavik, but got no farther than Cape York. Here, on the 9th of June, three Scotch whalers put in and furnished Dr. Stein with supplies. Dr. Kann returned to Dundee in one of the whalers, and Dr. Stein lived with the Eskimos at Cape York until the arrival of the *Windward*, which took him on board and landed him at the end of August at Payer Harbour. With a year before him Dr. Stein still hoped to do some exploration, but inferring, he says,

from additional facts gathered, that Sverdrup had almost certainly done all the work within reach of our limited means, I thought it best to devote my time to the study of the Esquimau language, and, later on, to a detailed plane-table survey of Payer Harbour.

Capt. Bauendahl, who wintered at Danes Island, Spitzbergen, has given up his original plan of pushing toward the Pole by the Franz Josef Land route. *Petermanns Mitteilungen* (Band 47, VIII.) learns from Tromsö that he is building a two-masted vessel, 26 feet long and 4 feet deep, in which, with two men and provisions for two years, he will drift as nearly as he may to the east coast of Greenland and from there press to the north.

Capt. Stökken returned to Sandefjord, Norway, on the 11th of August, from his expedition to Franz Josef Land to look for the three missing men of the Duke of the Abruzzi's party—Count F. Querini, H. Stökken (son of Capt. Stökken) and the Alpine guide, F. Ollier. The whole southern coast was searched in vain, and Capt. Stökken performed the melancholy duty of erecting at Cape Flora a memorial stone bearing the names of the lost men.

The Baldwin-Ziegler Polar Expedition left Tromsö July 17, and Archangel a week later, for Franz Josef Land. Mr. Baldwin has published, in *McClure's Magazine* for September, an account of his equipment.

He has three vessels: the *America*, a three-masted ship-rigged steamer of 466 tons burden, driving a single screw; the *Frithjof*, a sailing vessel of 260 tons; and the *Belgica*, well known as the ship of the Belgian Antarctic Expedition. He takes 400 dogs, 15 Siberian ponies, and, as he avers, the most complete outfit ever carried by an Arctic expedition. It will not be necessary, he thinks, to have his base at the northernmost extremity of Franz Josef Land

before the 22d of March, 1902, a month after the return of the sun, in order to reach the Pole, a distance of 550 miles, in season.

He proposes to return by the Polar current along the east coast of Greenland, and, that there may be no confusion of mind with regard to his undertaking, he makes this declaration *urbi et orbi* :

I desire here to emphasize the fact that the Baldwin-Ziegler Expedition was organized to *reach the Pole*. Neither scientific research, nor even a record of "Farthest North," will suffice; only the attainment of that much-sought-for spot, where one can point only to the south, can satisfy our purpose.

THE BRITISH SHIP *Discovery*, built for the National Antarctic Expedition, left Cowes on the 6th of August, after an inspection by the king.

The *Discovery* was built at Dundee. She has a three years' supply of food and fuel. She is rigged as a bark, displaces 1,750 tons, and measures 172 feet in length on the water-line, 16 feet in depth, and 33 feet in width amidships. Her walls of solid oak are between eight and nine feet thick forward, while they are at least three and one-half feet thick further aft. The bow is covered with steel plates, while the sheer has been designed to encounter pack ice. Bulkheads or partitions, extending crosswise in the ship, have been made to resist side pressure.

The ship has an asbestos lining an inch and a half thick, and when she winters in the ice a cloth of heavy felt will be stretched over her entire length. A powerful steam winch and an extra strong tackle on the mainyard will be employed in dredging operations. There are several cabins for special uses, and a laboratory on deck for the biologist. A room on deck, in which the magnetic instruments will be kept and read, has been shielded from the influence of steel and iron for a distance of thirty feet by the employment of brass where metal is required in that part of the vessel.

The *Discovery* is commanded by Commander R. F. Scott, R.N. The second in command and navigator is Lieut. Albert B. Armitage, R.N.R.

It is left to Commander Scott to decide whether the ship shall winter in the ice. He is to report progress at Melbourne early in 1903.

THE GERMAN ANTARCTIC EXPEDITION, in the steamer *Gauss*, left Kiel on the 11th of August. The *Gauss* is a wooden ship, specially designed for service in the ice, and strengthened by internal timbers and triple planking of oak, greenheart, and pitch pine. Her length

is 151 feet, and she draws sixteen feet of water. She is a three-masted schooner, with engines capable of a speed of seven knots.

The expedition is under the leadership of Professor Erich von Drygalski, of Berlin, famous for his study of Arctic glaciers, and the ship is commanded by Captain Hans Ruser, of Hamburg.

Kerguelen Island, in the South Indian Ocean, is the point to which the *Gauss* will go at first. She is to leave Kerguelen in December. If a passage can be effected through the ice, Dr. von Drygalski will try to make a landing on the Antarctic Continent west of Victoria Land. A winter station once established, sledge parties will be dispatched toward the Pole, and also toward the Magnetic Pole, the position of which is supposed to be in Victoria Land. At the end of the winter the Expedition will proceed to the Weddell Sea, and return home via South Georgia and Tristan Da Cunha.

THE SWEDISH EXPEDITION, under Prof. Otto Nordenskjöld, left Gothenburg, in the *Antarctic*, on the 16th of October.

By an agreement with the British and the Germans, the Swedes are to explore the region of the Antarctic south of the Atlantic Ocean. Prof. Nordenskjöld gives the following sketch of his proposed work: We shall proceed to Buenos Ayres and Tierra del Fuego, and thence to the Antarctic regions. We shall push as far south as possible, and when winter comes we shall send on shore a party of six persons, of whom I shall be one. We shall build a small hut, and engage in meteorological, magnetic, hydrographic, and other scientific observations. As soon as we have landed, the *Antarctic* will return to Tierra del Fuego, and a scientist, who will sail with her, will conduct the researches in that hitherto little-explored country. In this way we shall make as much of our time as possible.

ACCESSIONS TO THE LIBRARY.

JULY–OCTOBER, 1901.

BY PURCHASE.

ADANSON, M.—Voyage to Senegal, the Isle of Goree and the River Gambia. Translated from the French. London, J. Nourse, 1759. 8vo.

ARBER, EDWARD (Editor).—The Story of the Pilgrim Fathers, 1606–1623. London, Ward & Downey, 1897. 8vo.

AUBERT, GEORGES.—Les Nouvelles Amériques. Paris, E. Flammarion (1901), 18mo.

BARR, LIEUT. WILLIAM.—Journal of a March from Delhi to Peshâwur, and from thence to Câbul, etc. London, Madden & Co., 1844. 8vo.

BARRINGTON, R. M.—The Migration of Birds as observed at Irish Lighthouses. London, R. H. Porter (1900). 8vo.

BERNIER, F.—Travels in the Mogul Empire. Translated from the French by Irving Brock. London, W. Pickering, 1826. 2 vols. 8vo.

BETHAM-EDWARDS, M.—France of To-Day. London, Percival & Co., 1892. 2 vols. 8vo.

BIGELOW, TIMOTHY.—Journal of a Tour to Niagara Falls in the year 1805. Boston, J. Wilson & Son, 1876. 8vo.

BONWICK, JAMES.—Daily Life and Origin of the Tasmanians. London, Sampson Low, Marston & Co., 1870. 8vo.

BORCHGREVINK, C. E.—First on the Antarctic Continent. London, George Newnes, 1901. 8vo.

BORDE, PIERRE GUSTAVE LOUIS.—Histoire de l'Ile de La Trinidad sous le Gouvernement Espagnol. Paris, Maisonneuve, 1876. 2 vols. 8vo.

COILLARD, FRANÇOIS.—On the Threshold of Central Africa. London, Hodder & Stoughton, 1897. 8vo.

COURANT, MAURICE.—En Chine: Mœurs et Institutions. Paris, Félix Alcan, 1901. 8vo.

DAVIDSON, G. F.—Trade and Travel in the Far East. London, Madden & Malcolm, 1846. 8vo.

DAVIES, J. SANGER.—Dolomite Strongholds. London, G. Bell & Sons, 1894. 8vo.

DEASY, H. H. P.—In Tibet and Chinese Turkestan. London, F. Unwin, 1901. 8vo.

Dictionary of National Biography. Edited by Sidney Lee. Supplement, Vols. 1 and 2. London, Smith, Elder & Co., 1901. 8vo.

DIEHL, CHARLES.—En Méditerranée. Paris, A. Colin, 1901. 18mo.

DILLON, CAPT. P.—Narrative and Successful Result of a Voyage in the South Seas, etc., to ascertain the Actual Fate of La Pérouse's Expedition, etc. London, Hurst, Chance & Co., 1829. 2 vols. 8vo.

EDRÎSÎ.—Description de l'Afrique et de l'Espagne. Traduction, Notes, etc., par R. Dozy et M. J. De Goeje. Leyde, E. J. Brill, 1866.

FOSTER, WILLIAM (Editor).—Letters received by the East India Company from its Servants in the East. Vol. V., 1617. London, Sampson Low, Marston & Co., 1901. 8vo.

GAFFAREL, PAUL.—Histoire de la Floride Française. Paris, Firmin-Didot, 1875. 8vo.

GAFFAREL, PAUL.—Histoire du Brésil Français au Seizième Siècle. Paris, Maisonneuve et Cie., 1878. 8vo.

GATTY, MRS. ALFRED.—The Book of Sun-Dials. Enlarged and re-edited by H. K. F. Eden and Eleanor Lloyd. London, George Bell & Sons, 1900. 8vo.

GEVREY, A.—Essai sur les Comores. Pondichéry, A. Saligny, 1870. 8vo.

GIBBON, EDWARD.—History of the Decline and Fall of the Roman Empire. London, J. Murray, 1887. 8 vols. 8vo.

GORDON-CUMMING, C. F.—Granite Crags. Edinburgh and London, Blackwood & Sons, 1884. 8vo.

GROGAN, E. S., and SHARP, A. H.—From the Cape to Cairo. London, Hurst and Blackett, 1900. 8vo.

HAMY, DR. E.-T.—Etudes Historiques et Géographiques. Paris, Ernest Leroux, 1896. 8vo.

Harlaem Commons, Deduction of the Title to. New York, De Puy, Holmes & Co., 1872. 8vo.

HENNEBICQ, LÉON.—L'Orient Grec. Grèce et Sicile. Paris, l'Humanité Nouvelle, 1901. 12mo.

HOFFBAUER, M. F., *et autres*.—Paris à Travers les Ages. Paris, Firmin Didot, 1875–1882. 2 tomes, folio.

HOLDICH, T. HUNGERFORD.—The Indian Borderland. 1880–1900. London, Methuen & Co., 1901. 8vo.

HORREBOW, N.—The Natural History of Iceland. London, A. Linde, *et al.*, 1758. Folio.

HOSIE, A.—Manchuria, its People, Resources and Recent History. London, Methuen & Co., 1901. 8vo.

Internationalen Geographen-Kongresses, Verhandlungen des Siebenten. Berlin, W. H. Kühl, 1901, 2 Theile. 8vo.

LAWRENCE, WALTER R.—The Valley of Kashmir. London, H. Frowde, 1895. 4to.

LEGER, L.—La Save, Le Danube et Le Balkan. Paris, Plon, Nourrit et Cie, 1889. 8vo.

LEONARD, J. W., *Editor*.—Who's Who in America, 1901–1902. Chicago, A. N. Marquis (1901). 8vo.

LEROY-BEAULIEU, PIERRE.—Les Nouvelles Sociétés Anglo-Saxonnes. (Nouvelle édition.) Paris, A. Colin, 1901. 18mo.

LE STRANGE, G.—Baghdad during the Abbasid Caliphate. Oxford, Clarendon Press, 1901. 8vo.

MARIETTE-PACHA, AUGUSTE.—Itinéraire de la Haute Egypte. 3e Édition. Paris, Maisonneuve et Cie, 1880. 16mo.

MÉTIN, ALBERT.—Le Socialisme sans Doctrines: La Question Agraire et la Question Ouvrière en Australie et Nouvelle-Zélande. Paris, Félix Alcan, 1901. 8vo.

MEYNARD, C. BARBIER DE.—Dictionnaire Géographique, Historique et Littéraire de la Perse, etc. Paris, Imprimerie Impériale, 1861. 8vo.

MICHIE, ALEXANDER.—The Englishman in China. Edinburgh and London, Wm. Blackwood & Sons, 1900. 2 vols. 8vo.

MORRIS, WILLIAM O'CONNOR.—Ireland, 1798–1898. London, A. D. Innes & Co., 1898. 8vo.

MURRAY, JAMES A. H., *Editor*.—A New English Dictionary, Vol. V, H to K. Oxford, Clarendon Press, 1901. 4to.

New York, Manual of the Corporation of the City of. 1849. (D. T. Valentine.) New York, 1849. 12mo.

NORWAY, ARTHUR H.—Naples, Past and Present. London, Methuen & Co., 1901. 8vo.

O'CALLAGHAN, E. B., *Translator*.—Remonstrance of New Netherland, etc. Albany, Weed, Parsons & Co., 1856. 4to.

PAQUIER, J.-B.—Le Pamir. Paris, Maisonneuve et Cie, 1876. 8vo.

PECTOR, DÉSIRÉ.—Notes sur l'Américanisme. Paris, Maisonneuve, 1900. 8vo.

PEROWNE, J. T. WOOLRYCH.—Russian Hosts and English Guests in Central Asia. London, Scientific Press, 1898. 8vo.

PIOLET, LE PÈRE J. B.—Les Missions Catholiques Françaises au XIX^{e} Siècle. Tome III, Chine et Japon. Paris, A. Colin et Cie (1901). 8vo.

PLAYFAIR, R. L.—The Scourge of Christendom. London, Smith, Elder & Co., 1884. 8vo.

POUVOURVILLE, ALBERT DE.—La Chine des Mandarins. Paris, Schleicher Frères, 1901. 18mo. 2^{e} *Edition*.

POYNTZ, CAPT. JOHN.—The Present Prospect of the Famous and Fertile Island of Tobago. London, Thomas Malthus, 1683. 4to.

QUATREMÈRE, ET.—Mémoires Géographiques et Historiques sur l'Égypte, et sur quelques contrées voisines. Paris, F. Schoell, 1811. 2 tomes, 8vo.

SCHOMBURGK, ROBERT H.—History of Barbados. London, Longman, Brown Green & Longman, 1848. 8vo.

SCHUCKBURGH, E. S., *Translator*.—The Histories of Polybius. London, Macmillan & Co., 1889. 2 vols. 8vo.

SONNENSCHEIN, WILLIAM SWAN.—The Best Books. 2nd Edition. London, Swan Sonnenschein, 1901. 8vo.

SONNENSCHEIN, WILLIAM SWAN.—A Reader's Guide. (First Supplement to Best Books.) London, Swan Sonnenschein, 1895. 8vo.

SPENDER, H., AND SMITH, H. L.—Through the High Pyrenees. London, A. D. Innes & Co., 1898. 8vo.

STANHOPE, LADY HESTER. Memoirs of. London, H. Colburn, 1846. 2nd edition. 3 vols. 8vo.

STANHOPE, LADY HESTER.—Travels of. London, H. Colburn, 1846. 3 vols. 8vo.

TRAILL, H. D.—The Life of Sir John Franklin. London, J. Murray, 1896. 8vo.

WAGNER, H. (*Ed.*)—Geographisches Jahrbuch, Band XXIII, 2te Hälfte. Gotha, Justus Perthes, 1901. 8vo.

WYLDE, AUGUSTUS B.—Modern Abyssinia. London, Methuen & Co., 1901. 8vo.

Zeitschrift für Allgemeine Erdkunde. Berlin, D. Reimer, 1856. 8vo.

BY GIFT.

From Sir Martin Conway, Author :

The Rise and Fall of Smeerenburg, Spitzbergen. (Privately printed) s. l. s. a. 8vo.

From A. J. Drexel-Biddle, Author :

The Land of the Wine (Madeira Islands). Philadelphia, Drexel Biddle, 1901. 2 vols. 8vo.

From Hubert Droogmans, Author :

Notices sur le Bas-Congo, Annexes aux feuilles 1–15 de la Carte à 1:100,000, Bruxelles, Imprimerie Vanbuggenhoudt, 1901, 8vo; Feuilles 1–15 de la Carte de l'Etat Indépendant du Congo à l'échelle de 1:100,000.

From Henry Gannett, Author :

Boundaries of the United States, States and Territories, with Outline History of important changes. 2nd Edition. Bulletin, U. S. Geological Survey, No. 171.

From W. F. Ganong, Author :

A Plan for a General History of the Province of New Brunswick, Ottawa, et al., 1895, 8vo (from the Transactions, Royal Soc. of Canada, 2nd Series, Vol. I, Sec. II); A Monograph of the Place-Nomenclature of the Province of New Brunswick (contributions to the History of New Brunswick, No. 2), Ottawa, et al., 1896, 8vo (from the Transactions, Roy. Soc. Canada, 2nd Ser., Vol. II, Sect. II); A Monograph of the Cartography of the Province of New Brunswick, Ottawa, et al., 1897, 8vo (from the Transactions Roy. Soc. Canada, 2nd Ser., Vol. II, Sect. II); A Monograph of Historic Sites in the Province of New Brunswick (contributions to the History of New Brunswick, No. 4), Ottawa, et al., 1899, 8vo (from the Transactions Royal Soc. Canada, 2nd Ser., Vol. V, Sect. II).

From the Gesellschaft für Erdkunde, Berlin :

Verhandlungen des Siebenten Internationalen Geographen-Kongresses. Berlin, W. H. Kühl, 1901. 2 Theile. 8vo.

From Levi Holbrook :

Commercial and Financial Chronicle, Vols. LXIV–LXVII. New York, W. B. Dana Co., 1897–98. 8vo.

From E.-A. Martel, Author :

La Spéléologie. Paris, G. Carré et C. Naud, 1900. 8vo.

From A. A. Raven :

Marine Insurance: a Handbook. By William Gow. London, Macmillan & Co. 1900. 2nd edition. 8vo.

M. FROIDEVAUX'S PARIS LETTER.

PARIS, Sept. 20, 1901.

The *Service Géographique de l'Armée* received in 1887 not only its present name but its organization, of which I propose to say a few words in beginning this letter. Charged, as it is, with all the geodetic, topographic, and cartographic work necessary to the army in time of peace as in war, as well as with the perfecting of the instruments in use, the *Service Géographique* constitutes a department of the Ministry of War, and is divided into five sections, each with its proper functions and its special field. Each one of these sections (Geodesy, Surveys, Topography, Cartography, Accounts) has its responsible head to superintend the execution of the work prescribed by the *Directeur du Service Géographique*, who is at present Gen. Bassot, *sous-chef* of the General Staff of the Army, and member of the Academy of Sciences.

The personnel of the Geodetic section (which is under the *chef d'escadron d'artillerie* Bourgeois) determines the primary chains of triangles for laying down maps, measures arcs of meridian and parallels, and fixes in azimuth, latitude, and longitude the principal points of its triangulations. The measurement of bases, triangulations with their resulting calculations and the observations attached to researches on the forms of the land belong also to this section.

The section of Surveys under M. Romieux, lieutenant-colonel of engineers, performs the topographical work on a large scale, requiring mathematical exactitude.

M. Romieux is also at the head of the section of Topography, which makes surveys on the ground and the new maps, besides keeping up, by means of annual revisions, the map of the General Staff, preparing and executing surveys in Algeria, and establishing maps of foreign countries and the French colonies.

Col. Berthaut, of the infantry, is the head of the section of Cartography, the technical section of the *Service Géographique*. This section reproduces the work of the first three, brings together and groups the results, gives them a definitive form, and publishes them in maps on different scales. A number of officers are busied with French cartography, others with that of foreign countries; and the Section comprises working rooms for drawing, for engraving on

zinc and copper, for photography, heliogravure, electrotyping, and printing.

The section of Accounts regulates the employment of the funds of the *Service Géographique* and attends to the storing and distribution of the maps and to their sale for the Treasury.

In my next letter I shall present a summary of the work done by the *Service Géographique*, as now organized.

The vacation this year has been marked, as always, by the meeting of congresses, of which mention must here be made. The first was the National Congress of French Geographical Societies, held at Nancy in the beginning of August; the twenty-second session of this now well-established institution.

At this Congress, presided over by Vice-Admiral Fournier, several communications of an interesting character were made. M. Fauvel advocated the unification of the conventional signs employed in maps, and uniformity of scale (at least in countries which recognize the metric system), and the respect of the old denominations of localities drawn from an earlier form of the language or from dialect. The Congress expressed its wish that geographers and topographers might agree to adopt a single series of conventional signs, and that all maps should hereafter be constructed on simple scales, the denominators of which should be the factors 1, 2, and 5, and their multiples and sub-multiples. M. B. Auerbach presented a programme of decentralisation, calling for a geographical study of the natural regions of France, to serve as a basis for territorial divisions better adapted to the political and social life. This very delicate question will be brought before the next Congress, which is to meet at Oran in April, 1902.

The meeting of the French Association for the Advancement of Science was held in September at Ajaccio, Corsica, under the presidency of Dr. Hamy. The geographical section, of which Prince Roland Bonaparte is the head, has done a great deal of work; but the most important communications relating to Corsica were presented in other sections.

M. Th. Moureaux studied the distribution of the magnetic elements in the island on the 1st of January, 1896; M. V. Raulin offered his conclusions drawn from the recorded observations of the rainfall in Corsica for the period 1855–1899; M. A. Brive dwelt on the parallelism of the tertiary formations of Corsica and Algeria; and M. Roule, in a paper on the fishes of the Corsican coast, compared this portion of the island fauna with that of other localities in the western basin of the Mediterranean. Other inter-

esting papers may be noted: that of M. Meunier, on the cause of the disappearance of the ancient glaciers; that of M. Emile Belloc, on the reservoir lakes of the Pyrenees; the study of the ancient *massif* of the Barbary coast, with its influence on the structure of the coast ranges of Algeria, by M. Ficheur; the Abbé Radot's observations on the part played by the winds on the plateau of Langres; and the Fauna of the Arabian coasts, by M. Ch. Perez.

A word must be said of the singularly interesting display at Brussels of the paintings, sketches, and water-colours brought from Katanga by the painter Léon Dardenne, who accompanied Capt. Lemaire in his travels in 1898–1900. No such collection, rendering with truthfulness and vigour the aspect of the country and the details of the native life, had been back brought by any previous traveller.

It was in August that a number of geologists, collaborators of M. Michel Lévy, devoted their holiday time to a study of the Mont Dore, one of the most interesting regions of Auvergne, visited in August by the Geologists' Association, under the guidance of Messrs. Glangeaud, Giraud, and Boule.

At another point an accident furnished an opportunity for the decision of a question of local geography. It had frequently been suggested that the source of the Loue (in Franche-Comté), which is remarkably full and powerful, was a subterranean infiltration from the Doubs; but there was no proof of the fact until a fire occurred in an absinthe distillery at Pontarlier and thousands of gallons of the fluid were emptied into the Doubs, colouring the waters with a characteristic milky tint, which made its appearance a few days later in the stream of the Loue.

Many hydrological problems of a similar nature are still waiting solution. One of the most interesting is that of the Trou di Toro, studied without success by M. Emile Belloc, in the region of the headwaters of the Garonne. With regard to that of the Touvre (Charente), M. E.-A. Martel has confirmed by later investigations the explanation given in 1892, and has shown why the volume of this river increases and diminishes without ever running dry.*

In an article in *La Géographie*, for July, M. Martel presents a summary of his season's work in 1900. He finds that for mountain water-courses, as well as for the streams of the plain, the law holds

* The Touvre is supplied by three streams which flow from vast subterranean reservoirs.

good that for the increase of rapidity the volume of water is a factor much more important than the slope.

Worthy of attention, in an earlier number of the same review, is the paper in which M. Ph. Glangeaud, of the University of Clermont-Ferrand, studies, with the help of M. V. Sabatini's work, the history of the volcanoes of Latium (the Alban Mountains), the most important of the extinct volcanic centres in Central Italy, and traces the analogy of some parts of their history with that of the volcanoes of Iceland and of Auvergne.

The French explorers in Africa are extremely active. In Morocco, M. de Ségouzac has made with success a most dangerous expedition to the Rif; and M. Edmond Doutté, in a journey from Casablanca to Marakesh and Rabat, has studied the social and religious life of the people and investigated the relics of the Portuguese domination. At the other extremity of Barbary, M. Méhier de Mathuisieulx travelled, in April and May of this year, in Tripoli—a country hardly more than seen by the illustrious Barth in 1845 and closed against Europeans since that time by the Turks.

Col. Peroz has added to our knowledge of the region between Sorbo-Haussa and Zinder, and much has been done for the geology of the Gabun and the Cristal Mountains by M. Brousseau; while farther north, in the districts of the Campo and the Benito rivers, a reconnoissance by M. Lesieur gives an entirely new aspect to the map of the northern French Congo.

In the southeast, in the bend of the Ogowe and the Ngunie basin, a number of topographical surveys made in 1899–1900, by Lieuts. Rouyer, Gritty, and Avelot, have revealed the existence of the Bumi, an important affluent of the Manjibe, the mouth of which was located by the regretted Dutreuil de Rhins. In the interior, Messrs. Fredon and Cadenat have explored the Bali river, which proves to be the upper Lobaï. An interesting note on this reconnoissance was contributed by M. Fondère to *La Géographie* for August, which contains, also, a very exact report by Capt. Julien, on his journey from Mobaye to Krébedjé in 1899 across the Banghi basin and the Bugbu and Aduma countries. In this way every day adds to the knowledge of the French Congo; and much may be expected in Madagascar from the researches of M. Guillaume Grandidier.

Asia, as well as Africa, has her advocates and her distinguished explorers, and in the front rank of these we must place Prince Henry of Orleans. His crossing of the continent from northwest to southeast with M. Bonvalot, and his itinerary, in company with

Lieut. Roux, from Tonkin to the frontiers of British India, together with his published accounts of these and other journeys, revealed in him one of our best travellers, as well as a sagacious observer, who studied in detail the progress of the French Asiatic colonies, in the future of which he entertained a robust faith. He had just started on a new journey in the Far East when he was struck down by two dangerous complaints. The last of his Indo-Chinese studies is the story of his travels from Kratié to Nha-Trang, across Dar-Lac, a little-known and rarely-visited country, printed in the September number of *La Géographie*, with a sketch map. This paper and Comte Pierre de Barthélemy's reconnoissance of the Moïs Stiengs country complete in many ways the information gathered by the Pavie Mission.

In America a serious economical study of the north of Costa Rica was made in July, 1898–June, 1899, by M. Jules Second, and has been brought to our knowledge by Baron Hulot, who has set forth the results obtained in the districts drained by the San Carlos and the Rio Frio.

The French geodetic mission to Ecuador for the measurement of the arc of the meridian has selected the city of Riobamba for the starting-point of its work, which is directed by Commandant Bourgeois of the geodetic service of the army. Another French mission undertakes a general triangulation of part of the Bolivian plateau, from La Paz and Lake Titicaca to Oruro, to make astronomical observations and a detailed cartographic survey on a scale of 1:50,000. These operations will be conducted by Messrs. Bastide (father and son), Grimaldi, and Vaudry; while M. Dereims will study the geology of the country. In this way there will be made the beginning of a national map of Bolivia—something which neither Chili nor the Argentine Republic can be said to possess.

The detailed reports of some of the congresses held in Paris in 1900, now published, contain precious material for geographers. Foremost among these reports is that of the XXIst Session of the National Congress of the French Geographical Societies, brought out by the *Société de Géographie*. Some of the papers presented—that of M. Flamand, for instance, on the Reliefs and the Depressions of the Sahara—have not been printed; but the volume offers such studies as M. Marcel Dubois' article on the Definition and the Limits of Geography and the Classification of Geographical Sciences, the papers of Gen. Bassot, Commandant Bourgeois, and Col. Berthaut on the Present and Future Work of the *Service Géographique de l'Armée*, M. A.-A. Fauvel's essay in critical bibliography, entitled

New Chinese Cartography, and the note of M. V. Demontès on the Comparative Density of the European and the Native Populations in Algeria. Not less important is the second volume (Notes et Documents) of the 29th Session of the French Association for the Advancement of Science. In this, M. Jean Brunhes treats of the Boulevard as a feature of Town Geography; Messrs. J. Demorlaine and J. Poisson write on the Fixation of Dunes; M. Raulin considers the Observations on Precipitation in the Equatorial Zone (10° N. Lat. to 10° S. Lat.); and there are most instructive notes, such as that of M. F.-G. Dollfus on the Structure of the Paris Basin, that of M. E. A. Martel on the Subterranean Explorations accomplished in 1884–1900, and that of M. A. Leclère on his Geological Exploration in the Chinese Provinces bordering on Tonkin.

In the *Bibliothèque des Sciences Contemporaines*, the volume on Geology, by M. H. Guède, contains much that is valuable to geographers. The whole of the first book is devoted to the external and the internal geodynamics—that is to say, to the modes of manifestation of the modern energy. This very clear and precise résumé will be of great service to those who are beginning the study of physical geography, in spite of the fact that already it needs revision in one of its parts.

Information of the first importance, in fact, is furnished on a capital point of physical geography by the work of M. Charles Rabot on the Variations in Length of Glaciers in the Arctic and Northern Regions, and geologists will have to consider his conclusions, as well concerning the historical record of the variations as on the modes and forms of their manifestation.

M. Georges Blondel makes a contribution to economical literature in his solid volume, *La France et le Marché du Monde*. This opens with a picture of the economical development of the new countries; then goes on to show how the neighbours of France maintain their struggle against foreign competition, and closes by an examination of the question why the French people develop in so slight a degree, with an inquiry into their economical revival.

An excellent volume on the *Puy-de-Dôme et Vichy* belongs to the collection of Guides, begun in 1899, under the charge of M. Marcellin Boule. This, like the preceding volumes of the series, is composed of two parts (1: Monograph of the Department; 2: Itineraries), and is equally useful and helpful to the tourist, the man of science, and the archæologist. Dr. Delisle, of the Museum of Natural History, has brought out a study of the Montagne Noire et le Col de Naurouze. In this Story of an Error in Geography,

as he calls it, Dr. Delisle shows that the Cevennes do not come to an end, as the geographies declare, with the Montagne Noire at the Col de Naurouze, but that the Montagne Noire forms a *massif*, very clearly bounded on the south by the Fresquel, and on the west by the broad depression of the plain of Revel; beyond this rises a new relief in the hills of Lauraguais, or St. Félix, which separate the plain of Revel from the Pass of Naurouze.

One of the most noteworthy books published on West Africa, since the now classic volume of Capt. Binger, is Capt. d'Ollone's *De la Côte d'Ivoire au Soudan et à la Guinée*, an account of the march of the Hostains-d'Ollone party across the cannibal-haunted dense forest which stretches for a breadth of 350 miles from the Atlantic shore of the Ivory Coast and Liberia to the French Sudan.

The work is in two parts; one relates the events of the journey, the other contains the scientific appendices.

The Congo Free State has recently distributed a remarkable map (on a scale of 1:100,000) of the country between the Atlantic and Stanley Pool, with excellent notices by M. Hubert Droogmans. This fine publication—in fifteen sheets—is the first topographical map of this part of Africa.

In the new volume (continuing the series of works of the Pavie Mission, begun several years since by the Ministry of Public Instruction), M. Pavie tells how he was led, during his sojourn at Kampot, in Cambodia, to interest himself in the natives of eastern Indo-China, and to extend his acquaintance with the unexplored districts of their country. He began by travelling alone (from 1880 to 1885) in Cambodia and Siam, and then continued his explorations to the year 1889, in company with Capt. (now Commandant) Cupet and Capt. Nicolon, through Siam, Laos, Tonkin, and Annam. The present volume, illustrated by engravings and numerous maps, will be followed by a second, containing the work of the Mission for the period 1890–1895, and several volumes of narratives and accounts of travel, one of which (by Capt. Cupet) has already appeared. Though so little progress has been made with this publication (out of 10 volumes only 4 are as yet in print), it may be affirmed that those who find occasion to seek information on the subject of French Indo-China must always have recourse to its pages. By the side of such a work the narratives of Mme. Isabelle Massieu and Count Barthélemy are no more than notes jotted down by tourists, and devoid of scientific observation; while in the works brought out by M. Pavie and Capt. d'Ollone scientific information, instruction, and entertainment go hand in hand.

HENRI FROIDEVAUX.

OBITUARIES.

Charles A. Peabody.

Mr. Peabody, a Fellow of this Society since 1871, and for the past seven years a Member of the Council, died in New York on the 4th of July last at the age of eighty-seven years.

He was born at Sandwich, New Hampshire, and was graduated from the Harvard Law School in 1837. In 1855 he was appointed Justice of the Supreme Court of New York State; and in 1862 President Lincoln made him Judge of the United States Provincial Court for Louisiana. He was Judge also of the Criminal Court in New Orleans, and he became in 1863 Chief Justice of the Supreme Court of Louisiana. In 1865 he was appointed U. S. Attorney for the Eastern District of Louisiana, but resigned the position, and returned to New York, where he resumed the practice of the law till within a few years of his death.

Baron A. E. Nordenskjöld.

This great naturalist and Arctic explorer died in Stockholm on the 12th of August at the age of sixty-nine years.

Nordenskjöld was born at Helsingfors, and educated in the university of his native place. He settled in Sweden, where in 1858 he became Professor of Mineralogy in Stockholm. He made numerous voyages in the Polar seas, and undertook in 1870 to explore the inland ice of Greenland. This journey gave him an opportunity to study the nature of the ice formation, previously unseen by any geologist. He and his companion Dr. Berggren made rich collections of plants, marine animals, and stone implements. As the result of his inquiries and observations during this expedition he recorded the judgment [not confirmed by the experience of others] that dogs could not be employed with advantage in long sledge journeys in the regions where no game was to be had. In 1872 he made a voyage to Spitsbergen; and another in 1875 to the Kara Sea and the Yenisei River. The memorable passage of the *Vega* around the Arctic coast of Europe and Asia followed, in 1878–1879. In 1883, Nordenskjöld penetrated the ice on the east coast of Greenland—the last of his explorations.

Besides his many scientific papers he wrote: The Voyage of the *Vega* round Europe and Asia; The Second Swedish Expedition to Greenland; and two contributions of remarkable value to the history of cartography—The Facsimile Atlas, and The Periplus.

Baron Nordenskjöld was elected a Corresponding Member of the American Geographical Society in 1872, and an Honorary Member in 1878.

John Fiske.

Prof. Fiske died on the 4th of July last, at East Gloucester, Massachusetts.

He was born at Hartford, Connecticut, in 1842, and his name was originally Edmund Fiske Green. At the age of 13 he took the name of his great-grandfather, John Fiske of Middletown, in which place his boyhood was passed. He was graduated at Harvard University in 1863, and at the Law School in 1865; but he never practiced law. He became University Lecturer on philosophy and history, and he was for more than twenty years a member of the Board of Overseers.

Mr. Fiske was remarkable from his earliest years for devotion to study. He acquired languages with facility, and ranged through literature and science with equal zest and thoroughness. He was a good musician and singer, and he found time, with all his omnivorous reading, for out-of-door life and recreation. Though overweighted with flesh, he was apparently in robust health in spite of an absolute indifference to the laws of hygiene. His manner of life was described by himself in these words:

> Always sit in a draft, when I find one; wear the thinnest clothes I can find, winter and summer; catch cold once in three or four years, but not severely, and prefer to work in a cold room, 55 to 60 degrees. Work the larger part of each twenty-four hours, and by day or night indifferently. Scarcely ever change a word when once written, eat when hungry, rarely taste coffee or wine or smoke a cigar, but drink two or three quarts of beer each day, and smoke a pipe all the time when at work. Never experienced the feeling of disinclination for work, and, therefore, never had to force work. If I feel dull when at work, a half hour at the piano restores normal mental condition, which is one more argument for the hygienic and recuperative effects of music.

He was a prolific writer on almost all subjects, his more extended works being philosophical and historical; and all his productions were marked by sound scholarship, masculine good sense, and fairness of mind, which found expression in a clear and animated style, marred by occasional lapses into colloquialism. His contributions to American history may be regarded as his enduring monument.

Mr. Fiske was elected a Corresponding Member of the American Geographical Society in 1896.

NOTES AND NEWS.

PROF. CARLOS F. DE MELLO, of S. Paulo, is about to publish in Berlin, in French, a work on The Laws of Geography. This work consists of two parts. In the first the author considers the problem of the laws of science, and applies it to the present state of geography; in the second he studies the laws of mutual dependence.

The facts and the proofs, from the point of view of statical geophysics, are made to speak for themselves, either by the geographical and historical demonstration of their truth or their erroneousness, or by the revival of principles seemingly forgotten.

A bibliography of 500 entries, arranged chronologically, will enable the reader to turn to the sources.

IT IS ANNOUNCED in the National Geographic Magazine for October that the next International Geographical Congress (the Eighth) will be held in Washington in 1904, under the auspices of the National Geographic Society.

PROF. GEORGE DAVIDSON, of the University of California, sends the following interesting communication, made by him to the Geographical Society of the Pacific:

DAVIDSON OBSERVATORY
SAN FRANCISCO, CALIFORNIA,
August 26/01.

The Geographical Society of the Pacific, San Francisco:

GENTLEMEN:

During the last four years I have had numerous inquiries concerning the origin of the name *Cape Nome*, on the Northwest Coast of Norton Sound, Alaska. I searched every available chart and narrative of that region to trace it home.

I traced it back to Admiralty chart No. 2172, of 1853, as being the earliest to use the name; it is not in the Great Atlas of Tebenkof of 1848–'52, devoted to the North Pacific.

I looked up the tracks of the Sir John Franklin rescue ships H. M. frigate "Herald" and brig "Plover" (1845–'51), and became satisfied the name was given in the cruises of one or other of those vessels.

A short time since I wrote to the Chief Hydrographer of the Admiralty and asked if the name *Nome* appeared among the lists of officers of the "Herald" and "Plover."

To-day I have a letter from the Hydrographer of the Admiralty, dated London, August 9th, which contains this statement:

"When the MS. chart of this region was being constructed on board H. M. S. 'Herald,' attention was drawn to the fact that this point had no name, and a mark —(? Name)—was placed against it.

"In the hurry of dispatching this chart from the ship this ? appears to have been inked in by a rough draughtsman, and appeared as Cape Name; but the stroke of the 'a' being very indistinct it was interpreted by our draughtsman here as C. Nome, and has appeared with this name ever since.

"This information is from an officer who was on board the 'Herald' when the chart was being constructed."

So the mystery of the name has been satisfactorily solved.

Very respectfully,

GEORGE DAVIDSON.

THE STATISTICS of the French colonies (Importation and Exportation) for 1898 present the following figures, as printed in the volume just issued by the Ministère des Colonies:

IMPORTATION: 289,132,768fr. 70c. This shows an increase of 32,326,290fr. 66c. over the return for 1879 and an increase of 53,117,541fr. 87c. above the mean for the five years.

EXPORTATION: 287,016,707fr. 86c.; an augmentation of 23,306,050fr. 03c. above the figures for 1897 and an increase of 38,077,645fr. 90c. above the mean for the five years.

The returns for Algeria and Tunisia are not included in the Statistics of the Colonies.

For Algeria the importations amounted in 1898 to 302,223,058fr. and the exportations to 285,768,687fr.

For Tunisia the importations in 1898 were 53,521,152fr. and the exportations 44,196,837fr.

SR. JULIO CÉSAR VALDES, First Secretary of the Bolivian Legation at Santiago de Chile, sends a copy of a work entitled *Bolivia y Chile*, in which he examines the historical antecedents and the present state of the question at issue between the two countries. The American Geographical Society can have no opinion to express on such a matter, but it is a duty to say that Señor Valdes reasons well and closely and presents the case of Bolivia with calmness and dignity. He says in his preface:

This is not a polemical work. It is a plain and brief statement, supported by documents, of the right of Bolivia to exercise dominion and sovereignty over the desert and shore of Atacama, and of the development of the question with Chile since the war of 1879.

The book was published at Santiago at the close of the year 1900.

IT IS A PLEASING DUTY to congratulate the Société Nationale des Sciences Naturelles et Mathématiques de Cherbourg on the approaching completion of its first half-century. The Society was founded on the 30th of December, 1851, and more than thirty octavo volumes of its publications testify to the learning and activity of its members.

THE ROYAL GEOGRAPHICAL SOCIETY OF ANTWERP will celebrate the Twenty-fifth anniversary of its foundation by holding a Cartographical, Ethnographical, and Maritime Exhibition, to be opened in May, 1902.

SR. JOÃO DE MORAES PEREIRA writes from Horta, Fayal, under date of August 12, that, with the help of Prof. McLeod, of McGill University Observatory, and Mr. Hughes, of the American Commercial Cable, he has determined telegraphically the position of Horta Castle in Latitude 38° 31′ 45″, north, and Longitude 1 h. 54 m. 30.61 sec., west of Greenwich. This is thought to be the first Portuguese position fixed by time sent across the Atlantic.

THE INTERNATIONAL ASSOCIATION OF THE MERCHANT MARINE held its first Congress at Monaco on the 12th of April last in the Oceanographical Museum, erected for the preservation of the collections made by the Prince of Monaco in the Bay of Biscay, the Cape Verde Islands, Newfoundland, and Spitsbergen, and destined, it is hoped, to become the central oceanographic institute of the world.

Fifteen nations were represented at the meeting.

Mme. Cordozo de Béthencourt presented the first communication, on the subject of Homes for Seamen, and the Congress favoured the establishment of these houses in all seaports. This does not seem to be a new suggestion.

Lieut. Tapissier made a report on the use of kites and other aerial helps for life-saving; and M. Charles Bénard, President of the Oceanographical Society of the Bay of Biscay, discussing the question of life-saving apparatus on shipboard, advocated the principle of insubmergible rafts, utilised in ordinary as gang-planks. The sinking of the ship would leave these floating, and before putting to sea each mariner and passenger should have his place on the raft pointed out to him. M. Bénard spoke also of the nourishment of shipwrecked parties by means of systematic fishing, as studied and recommended by the Prince of Monaco.

The Congress hoped to see the adoption of the insubmergible rafts on the ocean steamers, and the posting of regulations for the embarkation of passengers and crew, in case of disaster, as well as the furnishing of the rafts with the apparatus for fishing.

Chevalier Pesce, Secretary of the Congress, proposed the creation of a permanent International Maritime Bureau for the regulation of ocean travel. The seat of this central Bureau would

naturally be Monaco, and the Prince, already burdened with cares none the less accepted the task of moving the great maritime Powers to action in the matter.

COURTEOUS ACKNOWLEDGMENT is made of an invitation to attend a festival on the 26th and 27th of October, to celebrate the Hundredth Anniversary of the foundation of the NATURHISTORISCHE GESELLSCHAFT IN NÜRNBERG.

THE GEOGRAPHICAL SOCIETY OF TŌKYŌ communicates the sad intelligence of the death, on the 24th of May last, of Mr. Watanabe Hiromoto, Vice-President of the Society, and its principal founder.